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ABSTRACT

With the support of instructors and administrators in selected Illinois community colleges, this teaching handbook was developed to help part-time instructors increase their understanding of contemporary learning and teaching theories and to apply them in their classrooms. The handbook is organized in 10 chapters that cover the following topics: (1) changing nature of work and training; (2) learning differences; (3) teaching basic skills; (4) teaching cognitive skills; (5) planning for instruction; (6) presenting lessons; (7) classroom management; (8) evaluating learning; (9) evaluating instruction; and (10) working with students with special needs. After providing information, each chapter lists recommended reading materials. A bibliography contains 34 references. (KC)

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TEACHING TECHNIQUES

FOR PART TIME COMMUNITY COLLEGE INSTRUCTORS

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Introduction

This teaching handbook represents the culmination of a three-year study of the impact of technology on the workforce and its ramifications for postsecondary career and occupational programs. Funded by the Department of Adult, Vocational, and Technical Education through the Illinois State Board of Education, this project initially studied the impact of technological change to determine the knowledge and skills required for competent workforce performance. Through an examination of relevant literature, analysis of recent workforce projection documents, and interviews with business and industry leaders, it became clear that competent workers in the future will continue to need specific technical skill training. In addition, increased levels of basic and higher order skills will be needed to enable workers to adapt to rapid changes in the workplace.

As a result of the increased importance of basic and higher order skills, the second year of the project involved an examination of postsecondary vocational curricula to determine if these skills were adequately addressed in the curricula. Through extensive interviews and classroom observations, it was found that many of the desired skills are given considerable instructional attention. However, other needed skills, particularly basic communication and computing skills, were found to be neglected in the curriculum. It was also noted that the degree of instructional emphasis on basic and higher order skills depended on the quality of the instructor. As a result, the third year of the project was devoted to the improvement of instruction in postsecondary career and occupational programs. With the support of instructors and administrators in selected Illinois community colleges, this teaching handbook was developed to help part-time instructors increase their understanding of contemporary learning and teaching theories and how to apply these theories in their classrooms. It is not intended to be a formal education textbook. Such books, while useful, are also readily available in most libraries and many bookstores. Instead, this handbook is intended to serve as a practical guide to improving instruction.

A limited number of printed copies of this handbook were distributed to the Illinois Vocational Curriculum Center, Sangamon State University, Springfield, Illinois; the Curriculum Publications Clearinghouse, Western Illinois University, Macomb, Illinois; and each Illinois community college. Each community college was also provided with an unbound hard copy of this guide from which unlimited copies may be made for non-commercial use. Comments on the guide, or suggestions for revisions, should be directed to the Department of Vocational and

Technical Education, University of Illinois at Urbana-Champaign, Education Building, 1310 South Sixth Street, Champaign, Illinois 61820.

The project staff would like to thank the following Illinois community college administrators and teachers who participated in this study. Those who suggested topics for inclusion in this guide and reviewed the entire publication are marked with an asterisk. Special thanks are also due to Sheri Kallembach for her contributions to this project.

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Chapter 1

Changing Nature of Work and Training

The Changing Workplace

The demands that employers make of their employees have changed and will continue to change.

No one doubts that the typical American workplace is changing. In the last 25 years many manual or simple mechanical tools and machines have been replaced by devices that use sophisticated computer controlled electrical and optical systems. Even more recently, improvements in robotics and computer science have led to a much wider application of fully automated systems. Because of this, the demands that employers make of their employees have changed and will continue to change as breakthroughs in science and engineering improve existing technologies and bring new ones on-line.

Recent rapid changes in technology have benefited our society in many ways and confused it in others. Nowhere is this confusion more apparent than in predictions of what types of skills will be needed by workers in the near and distant future. The intuitive expectation that technological advances will require comparable increases in worker training has been examined by many writers. Some have found this expectation to be unquestionably true and have lamented our inability to meet these new demands. Others have suggested that just the opposite is true: increasingly sophisticated machines will not require high levels of sophistication from most workers. On balance, it seems that each view is only partly true. While skill requirements will probably increase initially, further refinements in technology may actually decrease the technical expertise required of many workers.

The computer is an excellent example of this phenomenon. Early computers were complex devices, coaxed into operation each day by highly trained scientists, engineers, and technicians. Advances in electrical engineering and computer science have changed all that. Today's personal computers are immensely powerful by relatively recent standards, yet are advertised as being so easy to use that virtually any family member can benefit from having access to one. By decreasing the level of training required to successfully operate a wide range of computer software and peripheral equipment, computer manufacturers have integrated their products into most American's daily lives. At the same time, they have changed

the nature of the training required for most computer operators. Printers, production workers, clerical workers, and others have all seen similar changes in their jobs in recent years.

Technology has made some tasks easier to complete. However, ease of task completion is not the sole criteria for determining the training required for an occupational area. Regardless of the level of technical skill required in the workplace, employers want their employees to be able to learn, process, adapt, and apply new information and techniques in a broad range of skill areas. Plainly, today's teachers must find ways to prepare tomorrow's workers to perform in a changing environment. The ability to do so has been highly stressed in many of the recent reports criticizing the state of education in America.

Today's teachers must find ways to prepare tomorrow's workers to perform in a changing environment.

Beyond enumerating education's shortcomings, some reports have proposed specific goals for improvement. In addition to improving workers' thinking skills and adaptability, these reports have typically demanded that students be more skilled in reading, oral and written communication, and basic mathematics. The basis for these demands is fairly obvious. Written documents that accompany sophisticated equipment, and directions for conducting advanced processes, are often technically oriented and difficult to read. Recent surveys of workforce reading competency have shown a growing discrepancy between business needs and worker abilities.

Students must be more skilled in the "basics": reading, oral and written communication, and mathematics.

Always important for many workers, oral and written communication skills are becoming increasingly important for all workers as employees are asked to work cooperatively and participate in decision making activities. Further, as technology limits the personal connection between businesses and their customers, employers are looking for workers who can maximize the benefits of every contact with the public.

Traditional math skills, formerly used mainly for measuring, establishing ratios, performing basic algebraic and trigonometric calculations, and the like, now must also serve as the basis for a working knowledge of higher math, science, and machine language. Utilizing statistical controls and evaluating numerical data are no longer solely management level skills; workers at a variety of levels are being expected to perform these and related functions.

Obviously, then, technological change has altered the skills required of both technical and non-technical workers. And in terms of thinking and problem solving skills, there has been nothing short of an explosion in both the scope and level of required skills. Employers now demand that workers have both enhanced expertise and the ability to extend that expertise to new situations. Providing workers who possess these skills is a formidable task, and one which depends in a large part on the instructional skills of community college teachers.

Students must also learn more sophisticated thinking and problem solving skills.

The Changing Classroom

Students must be taught both the skills they need to get a job today and the skills they will need to respond to job changes in the future.

How can this be done? We can't teach a person to perform a process that hasn't been devised, or use equipment that does not yet exist. Even if we could, the training would be useful only until those procedures or machines were themselves replaced and the cycle begun anew. As occupational and career teachers, we must have two goals. First, we have to teach our students as much as we can about what they will need to know in today's marketplace. At the same time, we have to give them a solid knowledge base that will allow them to be quickly retrained when technical changes come along, or when economic or other factors cause them to seek employment in a new field. As Mortimer Alder noted in *The Paideia Proposal*, contemporary training programs must provide learners with "basic skills that are common to all work in a society such as ours."

This will require vocational educators to emphasize both "hands-on" workstation skills and "minds-on" generalizable skills, including problem solving, decision making, and knowledge utilization.

The high cost of purchasing, operating, and maintaining much of today's sophisticated technical equipment, and the relatively short time it takes for the equipment to become obsolete, is also changing the nature of vocational education. Specific vocational training is probably going to be left to the employer, but this will by no means reduce or eliminate the need for vocational education programs. Instead, vocational educators will find themselves working with employers to identify and update the basic transferable skills that graduates should have in order to meet ever-changing workplace demands. In other words, vocational education will expand from only teaching work station skills to include instruction in basic, hands-on and minds-on generalizable skills. These skills include solving problems, making decisions, applying technical knowledge, and utilizing and controlling technical knowledge, as well as job-relevant applications of traditional "academic" subjects.

We are, of course, talking about bringing about dramatic changes in the educational process. If you accept the proposition that change is a normal, healthy occurrence and an indicator of growth, then you will see this challenge as an opportunity. As a part-time career and occupational instructor, you are in a unique position to help bring about these changes. Community college administrators consistently list the occupational skills of their part-time faculty as a major strength in the development and maintenance of excellent instructional programs. As one administrator put it, instructors who also work in the field "bring world of work characteristics to the classroom." Your college supervisors and, more importantly, your students look to you as a role model for both classroom and on-the-job skills, attitudes, values, and behaviors.

Fulfilling the expectations of so many people can be a daunting assignment, especially when you realize that providing effective instruction in these areas involves much more than lecturing and giving tests. As Ian Winfield observed, "today's instructor requires not only sound analytic ability but also developed social skills in crossing barriers, in overcoming learner underachievement, and in making genuine human contact."

The task is made even more difficult by the fact that, while part-time instructors are experts in their field of specialization, they typically have had very little training or experience in teaching. This handbook is designed to help remedy that problem by suggesting practical approaches that can help instructors teach both the general skills that students will need in the future and the specific skills that they are expected to apply today. In this way, you and your students can meet the challenge of the future by staying on the cutting edge of change.

This handbook provides practical suggestions that can help instructors teach both the specific skills that students need today and the general skills that they will need in the future.

Recommended Reading

Carnevale, A. P., Gainer, L. J., and Meltzer, A. S. (1988). *Workforce Basics: The Skills Employers Want.* Washington, DC: U.S. Department of Labor and The American Society for Training and Development.

This text is among the most frequently cited studies when future workers' training needs are discussed. The authors describe in detail the skills that should be taught in today's schools.

Johnson, S. D., Evans, J. A., Galloway, J., and Foster, T. (1990). *Current Practice in Preparing the Future Workforce: An Analysis of Advanced Technology Programs in Illinois Community Colleges.* Springfield: Illinois State Board of Education.

The authors examine the extent to which business and industry needs are being addressed by community college programs that provide instruction in "sophisticated technologies." The strengths and weaknesses of the various programs are discussed.

Chapter 2

Learning Differences

Every Person Can Learn

One of education's modern cliches is that "every person can learn." Beyond being a catch-phrase, it is a concept that has been verified by a number of studies. As such, it will serve as our starting point for looking at ways to provide effective instruction. It will also provide a foundation for this handbook as we explore ways instructors can provide a comprehensive learning program by maximizing their limited time and resources.

Learning occurs in three steps: deciding what new information is relevant, organizing the relevant information in a sensible way, and integrating the new information into existing knowledge.

The first step in this process is to understand how people learn. According to Sternberg, learning involves three basic steps: sorting through new information to determine what is relevant and what is not, organizing the selected information in a way that makes sense to the learner, and merging the new knowledge with previous knowledge. Sternberg's research indicates that, generally speaking, a student's ability to learn depends on the strategies the student uses to learn and the amount of prior knowledge the student brings to the learning situation. Based on this view of learning, the more you know, the more you will be able to learn. In effect, the old adage "The rich get richer . . ." also applies to learning.

Because people use different learning strategies, instruction should be provided in a variety of ways to increase each person's chances of learning.

There is, however, a big caveat in this view of learning. While some people learn faster than others, nearly all people have the capacity to learn. People may use different learning strategies with varying levels of ability, but, given appropriate instruction, motivation, and time, people can and will learn. For example, a person whose natural abilities are more verbal than spatial might have great difficulty following a map but no problem at all with a set of written directions. A spatially oriented learner, on the other hand, might be able to selectively encode, combine, and compare the information on a map, whereas a long text would be confusing. Does this imply that one of these people is more intelligent, or at least a better thinker, than the other? Certainly not. It just means that some people are able to learn some types of information more efficiently than others. One way to increase the odds that learning will occur, then, is to teach in a way that allows your students to learn with maximum efficiency.

If everyone can learn, does that mean that all of your students will succeed in your courses? The answer to that question depends, of course, on many conditions; some which you control and others over which you have no control. For example, the way you plan and deliver your instruction has a tremendous impact on learning. So, too, does the student's financial and social "baggage" he or she brings to your courses. Your job as an instructor, then, is to provide the best instruction possible so your students have every opportunity to learn. Your ability to plan and deliver quality instruction cuts to the heart of employers' demands for graduates who are better thinkers and problem solvers.

Learning Styles

Learning takes place in a variety of ways, depending on how the learner thinks.

One key to effective instruction is understanding that learning takes place in a variety of ways, depending on how the learner thinks. One theory suggests that most peoples' thought processes are influenced more by one side of the brain than the other. So-called "left brain" thinkers tend more toward abstract figures, while those who are "right brain" dominant are better able to identify and process visual-spatial patterns and relationships. Although neither side of the brain holds an exclusive license on any thought function, this theory does seem to explain why a person might be far more capable in one area than another. For example, a person who is very skilled in calculus, which involves manipulation of abstract figures, may not do well in fine arts areas where creativity and spatial abilities are important. This does not indicate a deficiency on the learner's part. It does, however, challenge the teacher to find a way to impart skills by teaching to the learner's strengths while developing his or her areas of weakness.

Another brain-based dichotomy is that of global vs. analytic learning. Global students need to understand where learning is going before they can effectively assimilate details. Taking them step by step through either a procedure or narrative is fruitless if you haven't first told them where you are going to end up and why it is important that you get there. Analytic students take just the opposite approach. Giving them information out of sequence, or in vast, sweeping blocks, only serves to confuse them. Instead, they need to be led in an orderly fashion, step by clearly demarcated step, from beginning to end.

Independent of their left brain/right brain and global/analytic orientations, students also mentally organize information in different ways. Gregorc has proposed that this organizational process actually takes place on two levels: how learners perceive what is being presented to them, and how they mentally arrange what they perceive. Perception, according to Gre-

gore, is either concrete or abstract. Ordering abilities are either sequential or random. The model then goes a step further, combining perception and ordering processes to place most learners in one of four learning styles: abstract random, abstract sequential, concrete sequential, or concrete random.

Abstract random learners simultaneously pull information from a variety of sources and integrate the message with the environment in which it is presented. They learn well through group discussions but need time to reflect on and organize what they have learned before they put it to use. Abstract sequential learners take messages from a variety of sources and form mental pictures of the incoming information. The picture forming process is greatly enhanced when the learning process is well organized and flows smoothly from one point to another. The abstract sequential learners' efforts to pull in information from a variety of sources and organize it makes them very susceptible to distractions.

Concrete random learners perform best when they can take the concrete aspects of their environment and experiment with them, often using a trial and error approach. Minimally structured lab experiences coupled with the opportunity to work independently are a favored learning process. Concrete sequential learners also prefer direct involvement with the subject but respond best to being led through a step-by-step approach.

Critics of learning styles often complain that teaching to a particular style does not develop the whole person, and that by teaching only to preferences we give up control of instructional management by letting the learner determine how material will be taught. Learning styles advocates contend that the first of these arguments is negated by a basic learning styles tenet: if you can cover all the basic preferences in your lesson, you will both address each person's strengths and help him or her learn to process information keyed to other learning styles. Rita Dunn, a nationally recognized expert in learning styles, says that the second argument misses two important points. According to Dunn, studies have repeatedly shown that when students are taught according to their preferred learning style there is significant improvement in their performance on both teacher-made and standardized tests. Why? Because research has shown that students' preferences almost always correlate with biologically imposed areas of strength. That is to say, students' learning preferences are largely based on the learning style to which they are physiologically predisposed.

Students are physiologically predisposed toward certain learning styles.

To help make some sense of this jumble of theories that often seem to bump into one another, Bernice McCarthy brought together a committee of industrial executives and academicians from education, psychology, medicine, and management. They synthesized earlier learning styles research and concluded that there are really only four basic types of learners:

imaginative, analytic, common sense, and dynamic. In the October 1990 issue of *Educational Leadership*, McCarthy described these four styles in this way:

Imaginative learners see things concretely and then need time to think about them.

Imaginative learners perceive information concretely and process it reflectively. They integrate experience with the self. Listening and sharing ideas to learn, they are imaginative thinkers who believe in their own experiences. They work for harmony and need to be personally involved. They seek commitment and are interested in people and culture. Sometimes, because they see all sides, they have difficulty making decisions. They seek meaning and clarity. They find school too fragmented and disconnected from the personal issues that they find most interesting. They struggle to connect the content of schooling with their need to grow and understand their world.

Analytic learners can accommodate abstract information, but also need time to reflect on it.

Analytic learners perceive information abstractly and process it reflectively. They devise theories by integrating their observations into what they know. They learn by thinking through ideas. They need to know what the experts think. They value sequential thinking. They need details, and are thorough and industrious. They enjoy traditional classrooms and find ideas fascinating. Sometimes they enjoy ideas more than people — they can be cool and aloof. Seeking intellectual competence and personal effectiveness, they are highly skilled verbally and, generally, avid readers. They find school well suited to their needs.

Common sense learners need to take abstract information and work with it.

Common sense learners perceive information abstractly and process it actively. They integrate theory and practice, learning by testing theories and applying common sense. They are pragmatists: they believe if something works, then use it. Down-to-earth problem solvers, they resent being given answers. They value strategic thinking. They are skills-oriented people who like to experiment and tinker with things because they need to know how things work. They edit reality to cut right to the heart of things. Because they feel a strong need to work on real problems, they find school frustrating. They want to see how what they are learning is of immediate use to them.

Dynamic learners need concrete information and an opportunity to work with it.

> **Dynamic learners** perceive information concretely and process it actively. They integrate experience and application, learning by trial and error. Enthusiastic about new things, they are adaptable people who relish change. They excel when flexibility is needed. They often reach accurate conclusions in the absence of logical justification. They are risk-takers who are at ease with people, and sometimes they are seen as manipulative and pushy. They seek to influence. For them, school is often tedious and overly sequential. Because they seek to pursue their interests in diverse ways, they too are frustrated with the structure of our schools. (p. 32)

Most people do not fit neatly into a single category. Their learning styles are usually a blend of preferences, and the blend changes over time and across subjects.

It is not reasonable to assume that everyone will fit neatly into one of these types. Further, there is no reason to assume that a person will always be one type, or will always overlap types in a certain way. Different subjects may dictate different learning styles, and experience will almost certainly have some influence on a person's preferences.

Just how much work does dealing with learning styles make for the teacher? It largely depends on how you approach the task. Many teachers have reported that the extra time they spend teaching to the various learning styles is more than compensated for by the lack of re-teaching that is required on another day. It is, they say, an example of saving time and effort by taking the time to do it right the first time.

"Doing it right" does not mean that you need to give each of your students a learning styles test before you can teach them. Not only is that not the point of your instruction, but researchers are raising serious questions about the validity and reliability of many learning styles tests. Further, your students come to class to be taught, not to have their learning preferences analyzed. Engaging in such a process will be seen by your students as a waste of their valuable time and money, and may plant the impression that you are not serious about conducting a content-valid class. The best recommendation, then, is to ignore formal learning style assessment processes and try to teach effectively to all styles of learners.

Adult Learners

Young people and adults require different teaching strategies.

For a variety of reasons, adults are enrolling in community college classes in ever-increasing numbers. Consequently, providing instruction compatible with the needs of adults has become increasingly important. As long ago as 1933, European researchers realized that the traditional concept of teaching, pedagogy, was not completely applicable to adults. From its

Greek roots, pedagogy means "leader of children." They proposed the term andragogy meaning "leader of men." This term was popularized in the United States by Malcolm Knowles in 1973.

Adults see themselves as self-directed, not teacher-dependent.

Knowles has identified four main andragogical assumptions that are different from traditional pedagogical assumptions. First, whereas children see themselves as being dependent on others, adults see themselves as being self-directed. Adult learners typically feel that, by making a voluntary commitment to a learning program, they are demonstrating their capacity for self-direction. Trying to teach them as though they were largely dependent on the teacher creates tension between the learning experience and student self-concept. This, not surprisingly, interferes with learning.

Adults learn best when they can draw on previous experiences. They also seek to acquire knowledge based on need, and are problem-centered.

The second difference is that because adults come into learning situations with a variety of experiences, the best teaching methods are those that draw on these experiences. Such methods include discussions, laboratory simulations, and other hands-on, action oriented activities. Third, adults are inspired to learn not by expectations related to age or development but by the perception that a change in their role in society has or will necessitate acquiring new skills or information. The fourth difference is that while younger learners are typically subject-centered, adults are more problem-centered. That is, younger students study a subject with the intent of using it at some point later in life. Adults, on the other hand, want to apply their new found knowledge now, to problems that are currently a part of their lives.

Adults prefer teacher-directed instruction and self-directed evaluation.

Recent research on the subject of adult preferences in teaching style has shown that older students, and especially female students, tend to prefer a teacher-directed approach to instruction. These same students, however, tend to prefer an evaluation process that is more self-directed. In other words, older students want the teacher to take charge of the class and provide competent, effective instruction. When it comes to the evaluation of their learning, however, they prefer to engage in a cooperative relationship with the teacher. This, by the way, is fully compatible with another common characteristic of older learners: they tend to prefer a more affable and sociable relationship with their instructors than do younger students.

Students learn:
10% of what they read
20% of what they hear
30% of what they see
50% of what they see and hear
70% of what they discuss
80% of what they experience
95% of what they teach to someone else

With this understanding in hand, we are just about ready to look at how to address so many differing needs in your instruction. The last point to be made in this section relates to the types of experiences that lead to long-term learning. Students remember only 10% of what they read, 20% of what they hear, and 30% of what they see. If they both see and hear something, they still only remember half of it. But if they discuss what they saw and heard, they remember 70% of it. Best of all, students remember 80% of what they experience and 95% of what they teach to someone else.

Recommended Reading

Ackerman, P., Sternberg, R., and Glaser, R. (1989). *Learning and Individual Differences - Advances in Theory and Research.* New York: W. H. Freeman and Company.

An informative synthesis of research on how and why people learn differently, and what should be done to accommodate those differences.

Nickerson, R. S., Perkins, D. N., and Smith, E. E. (1985). *The teaching of thinking.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

This text reviews a number of contemporary educational research studies, compares and contrasts them, and draws conclusions regarding the validity of the conclusions. A very readable book, it is highly recommended to anyone interested in the finer points of how students of all ages can be taught to be better thinkers.

Chapter 3

Teaching Basic Skills

The New Integration

Historically, classroom instruction has been segregated into two categories: vocational and academic. Vocational instruction has primarily taught practical skills, with little or no emphasis on their basis in math and science. In most of these curricula, language and social science and higher-order thinking skills have often been ignored. Academic learning, on the other hand, has taken place with virtually no emphasis on the potential practical applications of the material being taught. Since the early 1980s, however, this arrangement has come under fire as being a primary cause of our national educational system's inability to produce workers who are technically, academically, and culturally literate.

You are expected to reinforce your students' basic skills.

Even though you are teaching in an occupational area, you are expected to reinforce students' basic communication (reading, writing, and speaking) and mathematical skills. To do so will not be difficult for you; you already possess these skills yourself. None the less, teaching in a way that reinforces these basic skills does require a certain level of pedagogical expertise. This chapter will help you develop that expertise.

Basic Skills Interventions

The responsibility for basic skills instruction is not yours alone.

How much remedial instruction are you expected to provide to students who are deficient in the basic skills areas? There is no clear-cut answer to this question. Your precise responsibilities will vary depending on the college at which you teach and the requirements of your department. You should know, however, that you are not solely responsible for providing remedial instruction.

Students with very weak skills should be referred for specialized help.

Almost all community colleges have a program designed to teach basic skills to students with deficiencies in one or more areas. These programs are typically housed in an area called the Basic Skills Center, the Learning Resource Office, or something similar. Your job is to refer students to this program when necessary, and then work with that program's instructors to help bring the student up to an appropriate level in his or her

particular areas of weakness. A student whose academic skills are weak enough to generate this level of concern probably needs specialized help. And the sooner they get the help, the better. Many career programs have minimum academic competency requirements that students should meet prior to admission to the program. If you have a student who has slipped into the program without having mastered these skills, he or she will probably experience difficulty in other courses, too. The sooner the problem is identified, the sooner a remedial program can be started. Remember, too, that every student *can* learn. Some just take a little longer, or need special help.

The decision to refer a student for help should not be taken lightly.

When you suggest that a student might benefit from special basic skills instruction, you are making one of the most crucial and confidential decisions an instructor can face. In all likelihood, you do not have the expertise to identify a person as being a special needs student. You are merely suggesting that an individual might benefit from evaluation by someone who is competent to make those judgements. How do you go about recommending a person for these services? Check with your department chair or the basic skills instructional service personnel. They will be happy to help you properly carry out this delicate and important responsibility.

All such referrals are extremely confidential.

Reinforcing Basic Reading Skills

The ability to read is of paramount importance for survival, not to mention success, in today's world. Yet, almost unbelievably, fully one-fifth of America's adult population is functionally illiterate. There is a very good chance, then, that you will encounter students whose reading abilities are far below what they should be.

Identifying individuals who have reading problems can be very difficult. Many of these people have developed a sophisticated array of coping skills to help them get by. These skills include inferring meaning from the few words they can read, paying very close attention to and picking up clues from auditory signals in their environment, and making very plausible excuses for why they should not read aloud and/or why they did not understand material that they "read."

People who cannot read often have coping skills that make detection difficult.

The hazards associated with passing a functionally illiterate person along into the workforce are illustrated by the true story of a man who was employed as a laborer at a warehouse. During breaks he liked to sneak off to a space among some boxes and enjoy an otherwise forbidden cigarette. Fortunately he was involved in a reading program and learned the easy way, rather than the hard way, that the boxes among which he liked to hide were labeled "No Smoking — Explosives."

Emphasizing new words in class and giving occupationally relevant reading assignments can help students improve their reading skills.

There is very little that you, yourself, can do in the classroom to help a person learn to read the many words that make up our everyday language. There are, however, several things you can do to help ensure that everyone in your class learns to read properly and pronounce the technical terms that you introduce during the course of instruction. These techniques include writing new words on the board and repeating them several times while students copy them into their notes, showing a piece of equipment or demonstrating a concept when you introduce its name, and labeling the materials and apparatus that the students will use in class.

In-class and homework assignments should be designed to give students opportunities to develop better reading skills. Such assignments might involve utilizing information contained in technical bulletins and service manuals, simulating ordering equipment or parts from a catalog, and following written procedural instructions. Assigned readings in trade journals and other occupationally relevant publications may be combined with written or oral reports to increase skills in several areas. Such readings have the added advantage of helping students stay up to date on developments in their field. If you are making up the information that the students will be reading, make sure that it is legible (typed copy is best), that the page has adequate margins on all sides, that there is adequate space between the lines, that the sentences are grammatically correct, and that all words are spelled correctly.

Reinforcing Basic Writing Skills

According to at least one report, employers typically expect their employees to be able to write legibly, spell correctly, capitalize properly, and use correct grammar. None of these skills should be beyond the reach of a student who has completed learning experiences at a community college.

Occupationally relevant writing assignments should also be given. When grading written work, always check handwriting, spelling, capitalization, punctuation, and grammar.

As with reading, the key to strengthening writing skills lies in a modified version of an old adage: practice does not make perfect, it makes for reinforced patterns of behavior. Practice only makes perfect if you practice doing the right things. The way to learn to write properly, then, is to practice writing properly. Toward this end, you should give occupationally relevant writing assignments as frequently as possible. Job-related assignments may include completing daily work sheets and other reports, filling out parts and materials requisitions, and preparing simulated written instructions for the next work shift. When grading written work, pay particular attention to handwriting legibility, spelling, capitalization, and grammar.

If you are unsure of your ability to evaluate these skills, don't just decide that the whole process is too much bother and give up on it. Remember, you are not the only person in the school who can contribute to your students' education. Your department may well have a working agreement with the English program, whereby you can get technical support and assistance. Also, the Basic Skills Office is likely to be more than willing to help you out. Again, check with your department chair or other teachers to find out what resources are available to you.

Reinforcing Basic Math Skills

Many career and occupational students come to the community college with extremely limited math skills. Often this is because the math instruction they received in high school was not appropriate to their learning style. Specifically, most of them were not taught math in a way that emphasized how the subject works and how it could be applied in interesting ways.

Integrate job relevant math into your instruction and provide concrete examples of how and why it is used.

Trying to teach basic math skills as an abstraction is a mistake that you cannot afford to make. Your students have almost certainly been through that process before. For some, it may have worked. But for others it almost certainly did not. The odds of your being more successful if you follow that same approach are very poor. Instead, integrate math into your instruction by showing how it is used on the job in the area for which the students are being prepared.

You can show your students that they can succeed if you help them experience success.

When you introduce the math component of a lesson, all of your efforts to create a positive, supportive classroom atmosphere will be repaid to you. Students whose mathematical background is based on failure and frustration will not be willing to go out on a limb and try again if they expect to fail again. The atmosphere you create must convince them that success is possible. Then, you must follow up by creating opportunities for early success.

Opportunities for success in math can be enhanced by using visual aids that are relevant to the curriculum. As with other types of learning, this is best done by comparing the new concept to what the student already knows. If you are teaching metric measurement, be prepared to compare metric and English measures. Rulers, beakers, scales, and solid objects comparing the two units of measure are examples of teaching aids that you might use. If you are teaching students how to multiply using decimals or percents, have a visual aid that can be separated into the units you will be describing. In other words, use concrete examples of the concept you are teaching so that concrete learners can connect your point to their world.

Simple, informal diagnostic exercises can motivate students and identify strengths and weaknesses.

You must expect that your students will function at a wide range of ability levels. It is often useful to start the semester by giving your students a diagnostic pre-test to determine how much course-relevant material they already know, and to identify areas of particular weakness. Based on this information, you can decide where to start your instruction. A formal written pre-test is not always the best pre-test. Students who have a good math background don't necessarily need the positive reinforcement that such a test might provide. On the other hand, students who are most lacking in math skills, the ones who need the most encouragement and help, may feel that their poor skills have put them behind from the start. A less formal pre-test, possibly based on very simple assignments and/or careful observation of student performance on highly structured assignments, may give you the information you need. If you begin at a fairly basic level and watch your students to see who is having trouble and who is sailing through, you will soon be able to provide individual or small group instruction that meets individual needs.

In addition to providing you with a means of assessing your students' abilities, informal pre-tests and observations can also be a powerful motivator. Students enjoy working in areas where they have success. Starting the class with a few virtually failure-proof, instructionally sound activities can provide the push some students need to get going in the right direction. As the course progresses, keep the math experiences lab oriented and avoid giving written tests until there seems to be a thorough understanding of the principles involved. Keep the instruction simple, too. Math is full of complex vocabulary that is not necessarily prerequisite for understanding the concepts you are teaching. When you are ready to give written tests, keep them short and to the point. That is, make all of your math test items occupationally relevant.

Check both the answer and the process used to obtain it.

When you evaluate a math assignment or test, check both the answer obtained and the process used to obtain it. Sometimes a wrong procedure can result in a correct answer. Conversely, if the procedure used is correct but the answer is wrong because of an arithmetic error, strongly consider giving the student partial credit. Losing out completely because of an error in arithmetic will immediately end any enthusiasm a student might have gained as a result of mastering a previously unknown process. Partial credit, on the other hand, can act as a carrot. It says to the student, "Look how far you've come! Now let's go the rest of the way."

Integrating vocational and academic curricula is beneficial for students because it teaches them how to blend the many skills they are supposed to learn during their school years into a comprehensive, functional package. It is good for the instructor because, by producing better educated students, it ultimately makes teaching easier. And it is good for our society because

it produces more adaptable and more productive workers. There are very few true win-win-win situations; those that do come along should get our full attention.

Recommended Reading

_____ (1987). *The Bridger's Guide.* Columbus: The Ohio State University, The National Center for Research in Vocational Education.

The Bridger's Guide is a collection of National Center publications that combine to present a rational and implementation procedure for the integration of academic and vocational curricula. The guide is available from the Illinois Vocational Curriculum Center at Sangamon State University.

_____(1987). *Instructional Program Development.* Columbus: The Ohio State University, The National Center for Research in Vocational Education.

This publication, like *The Bridger's Guide*, is a collection of National Center publications. It provides detailed, practical information on how to provide basic skills instruction. It is available from the Illinois Vocational Curriculum Center at Sangamon State University.

Chapter 4

Teaching Cognitive Skills

Cognitive Skills in the Future

Changing job requirements will require workers to perform both hands-on and minds-on tasks.

There is little doubt that cognitive skills are becoming more important each day. Tremendous changes have occurred and will continue to occur in the workplace. Equipment and processes are becoming more sophisticated, resulting in fundamental changes in the skills needed by workers. Increasingly, workers must perform both concrete (hands-on) tasks as well as abstract (minds-on) tasks requiring mental skills such as symbolic and abstract thinking. Management strategies have also changed in recent years. Just-in-time manufacturing, participative management techniques, statistical process control, and an increased emphasis on teamwork are just a few examples of the changing nature of the workplace.

The most important minds-on skills may be creative thinking, problem solving, and decision making.

As a result of the advances in technology and organizational changes in the industrial infrastructure, job expectations for workers have changed. Rather than simply performing repetitive tasks, workers are now expected to be skilled in many areas. While technical skills are still needed, they are not enough. Workers need to have a broader understanding of their role in the organization, be able to work in teams, and possess higher levels of communication and computational skills. Consequently, business and industry needs employees who possess a broad general education with heavy emphasis on math and science. While these changes suggest the need for a greater emphasis on academic skills, the most important job skills may be the ability to think creatively, solve problems, and make decisions. Additionally, workers must have the ability to learn in order to keep pace with the constantly changing world.

In order to cope effectively with the changes that will inevitably occur in their workplace, students must learn to change rapidly from familiar procedures to new ones. Teaching generalizable skills is an attempt to help students react confidently and quickly to changes in the workplace. What are these generalizable skills that students should learn? A few years ago they were called the basics: reading, writing, and arithmetic. But the basics have grown to include both generic use of technological tools (how many jobs rely on computers as a tool of the trade?) and the cognitive skills

addressed in this chapter. These are skills that every one of your students can and must learn.

Given the fact that the expectations of workforce skills have changed, are students being provided with the opportunity to acquire those skills? In most educational institutions the answer is no. These skills are not being taught in the majority of the schools — students are left to discover them on their own. Schools have traditionally focused on rote learning of information and developing observable skills rather than teaching students to think, solve problems, and make good decisions.

Because mental processes are not directly observable, teaching and evaluating them can seem difficult.

Why have schools been slow to emphasize higher level cognitive skills? Part of the difficulty in developing thinking skills is that these processes occur only in the mind and are therefore not directly observable. In addition, good thinkers and problem solvers may not know how they think and solve problems because experts' intellectual processes are often so automated that they occur naturally. Because mental processes are not directly observable, teachers are often unaware of how to teach them to students. As a result, students must discover them for themselves — something which is very difficult to do.

What are Cognitive Skills?

Cognitive skills include the ability to gain and apply knowledge, and control mental processing techniques.

Contemporary research in cognitive psychology is beginning to provide some clues on how to design courses which emphasize cognitive skills development. Before looking at techniques for teaching cognitive skills, we need to define what they are. Cognitive skills are those mental operations which enable your students to gain new knowledge, apply that knowledge in both familiar and unique situations, and control the mental processing that is required for performance.

There are many ways to describe cognitive skills. The framework provided in the text *Dimensions of Thinking* is a good place to start. Through a synthesis of recent research, the authors of this text identified five dimensions of thinking: thinking processes, core thinking skills, critical and creative thinking, metacognition, and the relationship of content to thinking.

Thinking Processes

Thinking processes are the product of combining specific thinking skills.

Thinking processes are complex mental operations which result from a combination of specific thinking skills. Eight different types of thinking processes which are used during learning and performance have been identified. The first three processes (concept formation, principle formation, and comprehension) are used primarily to gain new knowledge. The

next four processes (problem solving, decision making, inquiry, and composition) are used primarily during the application of knowledge. The final process, oral discourse, is used during both learning and performance.

Core Thinking Skills

Core thinking skills are mental activities directed at achieving a specific goal.

Core thinking skills are the specific mental activities that are used in combination to achieve a particular goal. It is the unique combination of these core thinking skills which define the broader thinking processes identified previously. The 21 core thinking skills identified in *Dimensions of Thinking* are grouped into eight broad categories. Although the categories are not all-inclusive, they do provide a way of organizing the specific skills which students must learn in order to become good thinkers.

Focusing Skills
1. Defining problems
2. Setting goals

Information Gathering Skills
3. Observing
4. Formulating questions

Remembering Skills
5. Encoding
6. Recalling

Organizing Skills
7. Comparing
8. Classifying
9. Ordering
10. Representing

Analyzing Skills
11. Identifying attributes/components
12. Identifying relationships/ patterns
13. Identifying main ideas
14. Identifying errors

Generating Skills
15. Inferring
16. Predicting
17. Elaborating

Integrating Skills
18. Summarizing
19. Restructuring

Evaluating Skills
20. Establishing criteria
21. Verifying

Core Thinking Skills (*Dimensions of Thinking*, p. 69).

Creative and Critical Thinking

Critical and creative thinking are unique aspects of thinking.

While many people equate creative and critical thinking with thinking processes, they are really unique aspects of all thinking regardless of the type of process used. People can engage in varying degrees of creative and critical thinking while solving problems, making decisions, and conducting research. For example, when engaged in a problem solving activity, one problem solver may use very creative approaches to arrive at a solution, while another may be less creative. Problem solvers may also differ greatly in the degree of critical thought used to reflect on the process needed to solve the problem. Thus, it is inappropriate to try to specify the amount of critical and creative thinking that should go into an assignment.

Creative thinking requires that the original idea be tested and refined before it is put into use. This involves critical thinking.

Creativity has a certain mystique that leads us to think of it as something that occurs in a flash of brilliance. The solution to making an automatic sewing machine (passing the thread through the head of the needle) came in a dream, and the concept of a vacuum cleaner sprang from watching workers blow dirt off train seats. Creativity is a process which involves considerable testing and refining before the original idea is fully developed. This process relies heavily on critical thinking.

Critical thinking is little more than a practical application of cognitive skills. But it is also an important part of creativity. For the purposes of our discussion, let's define creativity as the ability to come up with a product or solution that is both original and appropriate. In almost every case this involves both coming up with the initial idea and refining it to the point where it meets the need it was intended to address.

Although critical thinking can be improved through instruction, there is some debate as to whether creative thinking can actually be taught. If it is possible to teach someone to be more creative, then developing the proper cognitive skills is probably the best place to start. Learning critical and creative thinking skills, like learning anything else, involves practice and occasional missteps. If you intend for your students to engage in these activities, you must provide a classroom atmosphere in which they can devise and evaluate ideas without fear of failure or ridicule. Classroom and homework activities should be designed to foster these specific skills in addition to, or as a part of, projects to be completed.

Metacognition

Metacognitive skills are used to control one's own thinking processes.

Metacognition is another area that directly relates to thinking. Metacognition refers to an awareness and control of one's own thinking processes during the performance of specific tasks. Often called "strategic thinking," metacognition involves the planning that takes place before

engaging in a thinking activity, regulation of one's thinking during the activity, and evaluation of the appropriateness of one's thinking performance upon the completion of the activity.

Metacognition is an important regulatory process, since merely having knowledge does not mean that the knowledge will be used in the right time, place, or way. For example, a student might be able to use math skills to solve an equation but be unable to apply those same skills to a word problem. Metacognitive skills show up repeatedly in efforts to distinguish between experts and novices in virtually any given field. As the text *The Teaching of Thinking* points out, "Experts not only know more, they know they know more, they know better how to use what they know, what they know is better organized and more readily accessible, and they know better how to learn more still" (p. 101). Experts are more capable of recognizing what they don't know and find ways to work around those limitations.

The ability to apply metacognitive skills is a key difference between novices and experts.

The difference between the metacognitive skills of experts and novices is an important issue for vocational instructors. One of the goals of community college career and occupational programs is to increase students' level of expertise. A related goal is to increase the likelihood that these novices, our students, will acquire the ability to gain expertise long after they leave the classroom.

Content Knowledge and Intellectual Processes

As you begin focusing more of your instruction on cognitive skills, remember that considerable attention must still be placed on course content. Attempting to develop thinking skills without something to think about is like teaching engine repair skills to a mechanic without access to an engine: the theories and procedures can be talked about, but the necessary skills can never be fully developed.

Emphasis on cognitive skills must supplement, and not replace, emphasis on content knowledge.

Early attempts to create courses to improve cognitive skills were unsuccessful because they focused only on thinking skills and neglected the importance of subject matter knowledge. Recent cognitive research clearly establishes the link between content knowledge and cognitive skills. The classic study by Chase and Simon found that the superior performance of chess masters could be attributed more to their ability to recognize board layout patterns from past experiences, than to their hypothesized superior level of mental capability. In fact, Chase and Simon found that when the chess masters were confronted with unconventional chess layouts, the experts performed much like novices. A recent study by Chi, Feltovich, and Glaser also provides support for the importance of teaching intellectual processes within a context of a domain of knowledge. In a study of the thought processes of novices and experts in physics, Chi found that the two

There is a clear link between cognitive and content skills.

groups approached mechanics problems very differently. The better performance by the experts was attributed to their deeper understanding of physics principles. Without this deep understanding of the subject matter, the novices' intellectual processes proved to be inadequate for solving similar problems.

Emphasizing Cognitive Skills in your Teaching

Given the importance of cognitive skills in this world of constant change, how can you help your students become better thinkers? First you need to understand that a primary goal of your teaching is to help students develop the capacity for general and complex thinking skills. You should help your students:

1. attain a high level of knowledge in your subject areas.
2. acquire a repertoire of cognitive and metacognitive skills and strategies that can be used when engaging in various cognitive activities.
3. be able to use thinking skills and strategies with increasing independence and responsibility.
4. become aware of the nature of thinking and of the capability to control attitudes, dispositions, and development.
5. gain the ability to determine what is "good" thinking and be able to think critically and creatively. (*Dimensions of Thinking*, p. 130)

An Instructional Model for Enhancing Cognitive Skills

Traditional apprenticeship training involves three phases: modeling, coaching, and fading.

There are many ways to emphasize cognitive skills. The most promising is called *cognitive apprenticeship*, which uses many of the instructional strategies of traditional apprenticeship but emphasizes cognitive skills rather than physical skills. Traditional apprenticeship contains three primary components: modeling, coaching, and fading. The master craftsman models expert behavior by demonstrating to the apprentice how to do a task, while explaining what is being done and why it is done that way. By observing the master perform, the apprentice learns the correct actions and procedures and then attempts to copy them on a similar task. The master then coaches the apprentice through the task by providing hints and corrective feedback if needed. As the apprentice becomes more skilled, the master gives the apprentice more and more control over the task by "fading" into the background. Another important aspect of apprenticeship includes the emphasis on "real world" activities which are appropriately sequenced by the master to fit the apprentice's current level of ability.

Cognitive apprenticeship uses this same model.

Cognitive apprenticeship uses the same modeling, coaching, fading process to enhance students' cognitive abilities. During the modeling phase of cognitive apprenticeship, the instructor shows students how to complete a task or solve a problem while verbalizing the activity. However, in contrast to typical school instruction, the activity is modeled within the context of real world situations. Students are shown that there is often more than one way to solve a problem, that experts make mistakes, and that even simple problems may be very complex in the real world.

Following the modeling of the desired behavior, instructors need to become coaches. This involves observing students while they carry out a task, analyzing their performance, and providing hints and assistance if needed. Finally, as the students' cognitive skills become more accomplished, they will be able to perform with less and less instructor intervention. This fading aspect of cognitive apprenticeship results in the gradual transfer of responsibility for learning from teacher to student.

In addition to the three primary components, the cognitive apprenticeship model includes several other defining characteristics. These characteristics include increasing complexity and diversity in lesson sequences and a learning environment which promotes intrinsic motivation, cooperation, and competition.

Enhancing Cognitive Skills

Any instructional method that causes students to consciously work harder at learning will help them achieve the instructional outcomes. Thinking hard increases the clarity of new information and aids understanding and recall. One of the best ways to get students to think is to have them elaborate on the material. In general, elaboration means that students think about the meaning of the material; identify relationships to other information; connect new information to what is already familiar; and generate expectations, predictions, and questions about the material.

Asking students to elaborate on material forces them to think about it in greater detail.

One approach that forces students to elaborate is called *cooperative learning*. Cooperative learning incorporates small group work with a reward system that is based on the group's performance. Studies have shown that cooperative learning improves race relations between students, increases student's concern for others, and leads to increased learning. Two forms of cooperative learning that help students elaborate on new information and are easily adapted for community college classrooms include peer tutoring and paired problem solving.

Cooperative learning is a technique that can encourage elaboration.

Peer Tutoring

Peer tutoring is a very potent cooperative learning technique. It is based on the concept that you learn a subject best when you teach it to someone else.

Peer tutoring is a form of cooperative learning that has been shown to be especially effective. A recent study compared peer tutoring, adult tutoring, computer-assisted instruction, and reduced class sizes and found that peer tutoring was the most cost effective and academically effective approach.

The power of peer tutoring is based on the fact that you learn more about a subject if you have to teach it to someone else. When you have to teach a concept, you must be sure that you have a full understanding of that concept. In addition, you must organize relevant material in a way that makes it understandable to another person. Through this process, the student experiences the material as a "teacher" rather than as a student and therefore, gains an increased understanding.

In peer tutoring the instructor becomes a facilitator of learning rather than the authority figure who has all the answers. You can do this by giving your students assignments that involve teaching technical concepts and processes to other students. In this way, students are engaged in "deeper thinking" which results in increased learning.

Paired Problem Solving

Paired problem solving emphasizes both the solution and the problem solving process.

A second approach that forces students to think about new material is called paired problem solving. In this approach, two students work cooperatively on a problem. One student assumes the role of the problem solver who must read the problem aloud and then continues to talk about the problem as much as possible while the problem is being solved. The other student assumes the role of listener and makes sure that the problem solver keeps talking by asking the problem solver to "Tell me what you are thinking" at even the shortest silence. The listener's primary objective, however, is to attempt to understand every step made by the problem solver. The listener needs to know the route taken by the problem solver and understand the reasoning used to select that path. The listener should also ask questions whenever the problem solver's actions become unclear. At the same time, the listener must avoid asking questions with an intent to guide the problem solver. After each problem, the two students switch roles before beginning the next problem.

Your role in this strategy is to help your students understand their own roles. This involves sitting with pairs of students, monitoring their activity, and paying particular attention to the listener. Getting the right answer is not as important as getting your students to verbalize the route used to get the answer. Even if an incorrect conclusion is reached, how and why it was

reached will be understood, and it is far less likely that the error will occur again. After your students have mastered the technique, you need to provide support in a variety of ways, but remain more like the listener than the problem solver. Problems of increasing difficulty can gradually be added through this process.

Paired problem solving is based on the idea that analyzing complex material is an activity which is generally done inside the head. A beginner cannot observe how an expert thinks and solves problems, and an expert has difficulty demonstrating their technique to others. Having people think aloud while they solve problems provides a means of addressing this difficulty. If both learners and experts vocalize their thoughts as they work through complex ideas and relationships the steps taken in their thinking are open to view, and their activities can be observed and communicated. The thinking aloud approach causes students to become aware of their own thinking which leads to better cognitive performance.

Make Metacognitive Skills Explicit

As with any teaching endeavor, metacognition instruction must match the students' readiness to learn.

A growing consensus among researchers and teachers is that it is beneficial to explicitly and directly teach students both the concept of metacognition and the use of metacognitive processes. The first point in making metacognitive skills explicit is to be sure your level of instruction matches your students' readiness to learn. The information you present must stretch the learners' abilities, but not overwhelm them. Finding this balance is unquestionably the hardest part of teaching. In fact, with every person in your class potentially being on a slightly different level, about the only hope you have is to deliver a message sufficiently broad and deep to meet everyone's needs.

When using direct instruction, you should explicitly teach strategies and skills by explaining not only what the strategy is, but also how, when, where, and why the strategy should be employed. Then be sure to provide learning experiences which allow your students to use the cognitive skills you are trying to teach. You should also ensure that the responsibility for learning is transferred away from you to your students.

The circumstances and ways that metacognitive skills should be used must be explicitly explained to students. An opportunity to practice these skills should then be provided.

One final point is in order. To many students (and instructors!), the development of metacognitive skills seems painfully slow. The frustration that results is typically the result of emphasizing the product, or end result, rather than the process. This is a huge mistake. Part of the reason that experts can solve problems faster is that they have more experience at it. Developing speed is not important; that may come with time and even if it doesn't, that's not the goal. Thinking slowly but correctly is much better than thinking quickly but continually coming up with erroneous or misdirected ideas.

Practicing good thinking techniques is crucial. Remember, practice does NOT make perfect, it makes for reinforced patterns of behavior. If you want to work toward perfection, you have to practice doing the right things.

Your Role in Enhancing Cognitive Skills

Teaching cognitive skills requires careful observation of students' thinking and reasoning processes.

In order to effectively enhance cognitive skills, you must view teaching as a cooperative learning venture between you and your students. Your role is not to transmit information to the student: you should serve as a facilitator for learning. This involves creating and managing meaningful learning experiences and stimulating student thinking through questions and probes. Above all else, you must be knowledgeable about and pay close attention to student reasoning and thinking processes.

Instructors can model cognitive skills by working out solutions to unfamiliar problems during class.

An excellent example of the teacher's role in developing cognitive skills has been used for teaching mathematical problem solving. In this approach, Alan Schoenfeld from the University of California at Berkeley teaches a set of problem solving strategies to his students. His teaching involves showing students how he, as a mathematician, solves problems. However, unlike most teachers, he does not work the problems out in advance in order to show the students a smooth and successful solution. He even encourages his students to bring problems to class for him to solve. By being confronted with unfamiliar problems, Schoenfeld is forced to solve them as a mathematician would: by using a variety of strategies and by making errors. Through this technique, the students have the opportunity to see that there are many ways to solve mathematical problems and that even expert mathematicians make mistakes. Schoenfeld does not stop his problem solving activity when an answer has been found, because mathematicians in the "real world" continue looking for alternative solutions and easier methods to solve the problem, and attempt to generalize the solution to other problems.

Because technical content in community colleges is often taught through a problem solving method, Schoenfeld's instructional approach can be easily adapted to your classrooms. Technical instructors need to act like technologists in their classrooms. They need to solve unfamiliar technological problems for students and not be afraid to make errors or have difficulties finding solutions. By serving as a role model, you can show your students how to collect and use information to solve technological problems, and help them realize that not all problems have straightforward and simple solutions.

Using What You Know

In occupational and career curricula, we are concerned with helping students gain and use new knowledge and skills. The main reason we engage students in laboratory activities is to help them make the connection between "textbook" knowledge and "real world" applications. Through these experiences, we hope to teach them to perform certain production sequences. A machining student, for example, might be taught sequences such as loading software into a computer-integrated manufacturing machine, preparing the environment in which the machine is to work, and monitoring and evaluating the machine's output. Hopefully, at the end of a course of instruction, the student will have learned enough sequences to perform quickly and efficiently. Even with the best efforts to teach problem solving, metacognition, critical thinking, and creativity, it is not likely that an ordinary group of students will be turned into geniuses. But some gains are to be expected, especially if these processes are repeatedly addressed throughout the course of a student's program of study.

Instructors must remember that they are responsible for teaching both immediately applicable practical skills and general skills that will be used later in life.

Perhaps the real issue is this: vocational programs are more than ever being expected to provide both training, in terms of immediate practical skills, and education, in terms of enhanced overall competence. Forcing these new requirements into an already crowded syllabus is no small feat. It requires preparation, planning, patience, and persistence. It also requires attending to the details of effective instruction, outlined in the next chapter.

Recommended Reading

Marzano, R. J., Brandt, R. S., Hughes, C. S., Jones, B. F., Presseisen, B. Z., Rankin, S. C., and Suthor, C. (1988). *Dimensions of Thinking: A Framework for Curriculum and Instruction.* Alexandria, VA: Association for Supervision and Curriculum Development.

The authors define key cognitive skills that can and should be taught as a part of any instructional program, and provide suggestions on how to carry out this task.

Chapter 5

Planning for Instruction

The Need for Planning

Lesson planning initially takes a lot of time, but ultimately saves time by making your lessons more effective and efficient.

How is a part-time instructor supposed to deal with learning psychology, individual differences, and basic and cognitive skills? The answer, of course, is through careful lesson planning. Like attending to different learning styles, planning your lessons will require a lot of time up front. The payoff is that less time will be spent revising what should have been taught correctly in the first place.

Why is lesson planning important? Teaching a class is a lot like leading an expedition: you're taking a group from the known to the unknown. As the leader, you're responsible for ensuring that the group does not get sidetracked or, worse yet, completely lost. Studies of effective teachers show that planning can improve instruction in many ways. Careful planning can help you feel more confident about lesson content. This helps reduce the anxiety that occurs before every teaching opportunity. Careful planning also helps you prepare for the process of teaching. This involves organizing your thoughts about the lesson, assembling the needed materials, and managing the available time effectively. Finally, careful planning helps you plan for and avoid potential problems. By having instructional materials and equipment readily available and getting a lesson started properly, you can avoid many of the difficulties that plague unprepared teachers.

In Chapter 4, we discussed the advantages of modeling problem-solving techniques by working through unfamiliar problems. This does not conflict with the main point of this section: that good planning is crucial to good teaching. In fact, the two propositions go hand in hand. Problem solving can and should be a spontaneous activity that is planned to occur at a specific point in a well-organized lesson. It should not be an excuse for "winging it."

Types of Planning

All instructional assignments involve some type of planning.

Teachers engage in a variety of planning activities. These include deciding what to teach, how to teach it, and how to determine what learning took place. Because all community colleges operate differently, the role of part-time instructors in planning varies greatly. In some cases, the curriculum and lessons are already prepared; you will be expected to only be prepared to conduct the lesson. In other cases, you will be expected to become heavily involved in planning. Whatever situation you find yourself in, you need to be ready to engage in some type of instruction planning.

Curriculum Planning

Curriculum design is a specialized type of planning that will probably be done by department and college administrators and senior faculty.

Most part-time instructors are not expected to be involved in the curriculum planning process. Developing occupational curricula is a complex and lengthy process that must involve instructors, administrators, and business and industry representatives. While curriculum planning is beyond the scope of this text, having the knowledge and skills necessary to develop curricula can certainly be important for part-time instructors. If you are given the opportunity to contribute to curriculum planning, we suggest you obtain the recommended readings at the end of the chapter.

Lesson Planning

Lesson plans are the map that keeps you on the right road. Beyond that, they also help you keep track of what you did in previous classes and, if you prepare them in advance, what you are going to do in the future. As we will see in Chapter 8, they are also helpful when you plan evaluations of student learning.

Lesson plans are a tool that must fit your particular needs.

Probably the most important part of a lesson plan is the flexibility you build into it for both yourself and your students. The actual written lesson plan is a tool that you custom build to suit your purposes for a specific lesson. In some cases you will need only a brief outline of your plans. In other cases a more detailed outline will be needed. However it is arranged, and however extensive or abbreviated it may be, a good lesson plan will provide the information you need to direct and control the lesson. A model lesson plan is shown on page 31.

Daily Planning

Research shows that daily plans are one of the most used and important plans for effective instruction. Even if you are given a very complete set of lesson plans to teach from, you must engage in additional

Lesson Title:

Page: 2 of 2

Time Estimate	Main Points	Details of Instructional Content, Methods, and Procedures
5 min.	Introduction	Introduce the concept of definition and relate the definition to students' knowledge
20 min.	Description of Definition	Geometric property of definition Factors in determining definition Definition of quality of image Factor in determining quality of image
15 min.	Influencing Factors	
10 min.	Total Unsharpness	

LESSON PLAN #1

Course Title: Radiology 141
Unit Title: Radiographic Imaging
Lesson Title: Radiographic Definition

Page: 1 of 2
Date: 00/00/00
Instructor: John Smith

Learning Objectives:
At the completion of this lesson the students will be able to:
- describe the elements of visual sharpness (content knowledge)
- describe the factors that influence degree of sharpness (process knowledge)
- explain the control of overall sharpness (process knowledge)
- list and define new terms used in the lesson (content knowledge)

Estimated Lesson Time: 50 minutes

Materials and Equipment Needed:
- overhead projector and transparencies
- X-ray samples
-

OVERHEADS: 27-32a, 34

HANDOUTS: none

Method of Instruction:
Lecture
Group discussion

Assignment for Next Week:
Read pages 137-184

Introduction:
- A key factor in determining the usefulness of an X-ray is the clarity of the image on the film. Clarity is called definition.
- When we talk about high definition TV sets, we are talking about a TV with an ultra-sharp picture
- That is the same thing we are talking about when we discuss radiographic definition -- image sharpness
- Today we are going to look at how definition is defined and examine some of the factors that influence definition quality.
- Quality is described not in terms of how sharp an image is, but how unsharp it is.

You will certainly be responsible for preparing daily plans. These plans help you accommodate last minute changes to lesson plans, and other special circumstances.

planning. Because lesson plans are typically developed well before instruction takes place, they can only help you prepare for normal situations. However, anyone who has taught knows that last minute changes in lesson plans are to be expected. It is common for supplies and films to arrive the day after they are needed and for equipment to break down before a demonstration. Daily plans help you prepare for any last minute changes that occur before you teach a lesson.

While curriculum and lesson planning are formal processes, daily planning is very informal. In fact, the "To Do" list is an excellent example of a daily plan. As you review the lesson you will be teaching next, think about what supplies and equipment will be needed, how the class or lab should be arranged, what assignments should be collected, and what announcements need to be made. Specific things that are not included in the lesson plan should be written down and attached to the lesson plan to remind you of any additions or changes in the formal plan.

Lesson Structure

All lessons should include an introduction, the main presentation, opportunities for student practice, and a means of evaluating learning.

Before actually writing a lesson plan, it is important to understand the structure of a lesson. A lesson is a self-contained portion of a larger instructional unit that has a definite structure. Effective lessons typically include an introduction, the presentation of content, an opportunity for students to practice what was taught, and an evaluation of student learning. Each of these components should be included in every lesson. It is important to note that a lesson may not take a full class meeting, or it may run on for several meetings.

A "lesson" may last for several class periods, or for only a part of one class period.

Introducing a Lesson

Good instructors would like students to be engaged in the day's topic from the moment class is scheduled to begin. This is a good theory that is impossible to put into practice unless you ignore the administrative requirements of your job (taking attendance, collecting and handing back papers, etc.). However, when the administrative chores are completed, effective instructors get students mentally ready to learn. This involves gaining their attention, establishing the relevance of the lesson, and motivating them to learn. Their minds are filled with any number of distractions and they may not be mentally prepared to learn.

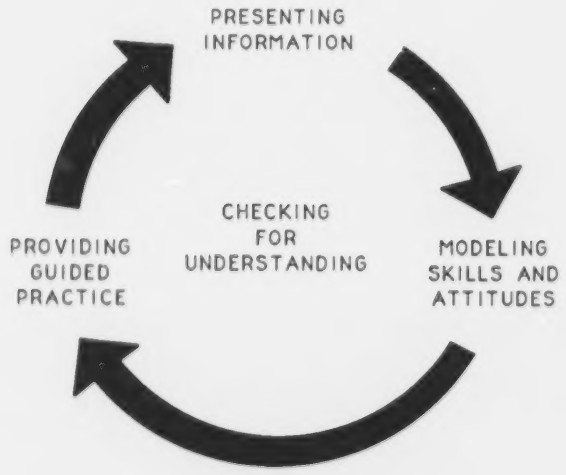
Effective instructors use novel, surprising, or uncertain events to get students interested in the topic of the day. Clearly stating the learning objectives for the lesson is another effective technique for focusing student minds on the lesson. Good instructors also establish the relevance of the

topic by using familiar examples and relating the content to past and future instruction. The goal of the lesson introduction is to get students motivated and mentally ready to learn. One word of caution about motivating students: be careful that what you intend to be a motivating statement will be perceived as such by the student. As the baseball player Carlton Fiske once observed, "Everyone needs a kick in the seat once in a while, but no one needs a knife in the heart."

Covering the Content

Following the Learning Cycle ensures that your lesson will include input, modeling, guided practice, and a check for understanding.

Covering the content does not mean that the instructor "spoon feeds" the content to the students. The standard approach to instruction is to transmit information to students through lectures and demonstrations and then send them off to apply the knowledge on their own. In this way, the information is passed on to students much as water flows through a conduit. As the recipients of the information, students can either absorb the information or let it flow past. While this may be the way most of us learned in school, it is a very weak instructional model to follow. We recommend you cover the content by following a set sequence of activities which we call the "Learning Cycle." The learning cycle is made up of four components: input, modeling, guided practice, and checking for understanding.



LEARNING CYCLE

Input is the presentation of the lesson.

Input and *modeling* are the first two stages of the learning cycle and are commonly used together. During these stages you present information to the students using a variety of instructional methods. Input can involve instructional methods such as lecturing, demonstrating, discussions, role plays, and case studies. Modeling is your opportunity to show the students how to put to use what they are learning by showing them what they are expected to know (i. e., how to solve a problem, how to move a patient, how to use a software application). Modeling goes beyond displaying correct skills; it also includes displaying proper attitudes. Your students need to be taught the proper workplace attitudes and behaviors specific to your occupational area. You are a role model for appropriate, realistic modes of behavior, and your classroom is a place where these behaviors are learned and practiced.

Modeling demonstrates both proper skills and attitudes.

Guided practice gives students individualized feedback and instruction.

Guided practice is the third stage of the learning cycle. Here is where students are provided the opportunity to try out the skills you have just taught them. The opportunity to immediately mimic what the teacher has modeled is a crucial part of the learning process. Remember that students learn 80% of what they experience. At this point, your responsibility is to motivate, guide, and reassure those students who need help, and to allow those who are on the verge of being ready for independent practice to push their limits as far as they can. You are responsible for providing as much or as little help as is called for at the moment, always with the understanding that your ultimate goal is to make yourself obsolete — to prepare your students to successfully function without your being there.

Checking for understanding identifies individual and general misunderstandings before incorrect information is learned.

The final stage of the learning cycle is called *checking for understanding*. Regardless of your method of presentation, it is a good idea to check to see that everyone in the class is keeping up with the lesson. Techniques include asking a specific question and then calling on a student to answer, asking a question in true-false form and asking everyone who thinks the answer is true (or false) to raise his or her hand, and simply asking if there are any questions. Be very wary of situations where no one has any questions. It may be that everyone understands everything. It may also be that they are too confused or intimidated to ask anything.

Independent practice gives students time to become comfortable with their new skill.

As you interact with the students during the input, modeling, and guided practice stages of the learning cycle, you will find out if some students are having difficulty understanding the new information or acquiring the desired skills. If this is the case, your job is to cycle through the learning cycle again by presenting and modeling the information a different way, and providing more guidance during the practice stage. By ensuring that everyone is keeping up with the content and is acquiring the ability to use the new knowledge, you will be confident that your instruction has been effective.

Helping Students Practice What They Learned

Once you are confident that your students have succeeded in learning the content of the lesson, you then need to provide them with the opportunity to reinforce their learning through practice. Studies of expertise have shown that a major factor in acquiring expertise is repetitive experience. This component of a lesson, called *independent practice*, is where students begin to acquire expertise by learning how to perform quickly and easily. They are already able to compete the tasks they have been taught; now they need to work independently to automate their skills. Homework assignments and independent lab exercises are two appropriate activities for independent practice.

Evaluating Student Learning

Evaluation takes place after the content has been learned and practiced.

Because all lessons are designed to help students achieve one or more learning objectives, the lesson does not end until the instructor is sure the objectives have been met. When the instructor is confident that the students have learned the content thoroughly, it is time to evaluate that learning. A variety of techniques are appropriate for measuring student learning. These include testing, questioning, and observing. Each of these techniques are discussed in Chapter 8.

Developing Lesson Plans

Lesson plans must include a clearly stated learning objective and a lesson outline.

There are many reasons for writing lesson plans. There are also many different formats for lesson plans. Through experience, instructors choose a format that works best for them. Lesson plans typically contain the course and lesson title; the name of the person who developed the lesson; the learning objectives; lists of supplies, equipment, and handouts needed during the lesson; assignments; and an outline of the content to be covered. While all of these items greatly improve the usefulness of lesson plans, two items of critical importance are the learning objective (a statement of what you want to accomplish) and an outline of what you intend to do.

The following list identifies some of the many reasons for developing lesson plans:

- They are planning tools which help you plan the details of the lesson.
- They can be used to rehearse the lesson before it is taught.
- They can be road maps or scripts you follow during the lesson.
- They make teaching the same lesson again at a later date much easier.
- Some employers will require you to develop lesson plans.
- If you need to miss a class session for some reason, they will help your substitute teach the class.
- They can be used to support your competence in liability-oriented legal actions.

Learning Objectives

Learning objectives state precise and measurable conditions, skills, and evaluation standards.

A learning objective is a concise statement of exactly what knowledge, skill, or attitude you expect your students to acquire during the lesson and any related laboratory activities. Learning objectives are important because they help guide instruction, learning, and evaluation. Objectives guide instruction by answering the question "What do I want students to learn?" By being clear about the outcome of the instruction you will be able to plan appropriate instructional strategies which help student learn. Preparing learning objectives can also help students learn. Research shows that learning will increase if you make your students aware of the objectives of the lesson, if you plan objectives that build on students' prior knowledge, and if the objectives are precisely stated. Finally, objectives will help you plan your evaluations because each item on a test or observation scale must provide evidence that the students have reached the objective of the lesson.

Performance standards must meet both institutional and industrial standards.

A properly written objective is really quite basic, containing only three vital parts: the conditions under which the learning or performance will be evaluated, the knowledge to be gained or the task to be completed, and the standards against which the evaluation will be made. For example, "Using CAD software and the necessary hardware, the student will produce a 3:1 scale drawing of a 10-32 carriage bolt with at least 70% accuracy." Or, "On a paper and pencil test, the student will identify and explain the reasons for ten safety rules for a NC milling machine with 100% accuracy." Such a statement unequivocally tells both the instructor and the students what will be taught and how it will be evaluated.

Performance standards indicate the minimum level of speed and/or accuracy with which the task must be completed. *Accuracy standards* should reflect the standards expected of workers in the field or the grading policy at your institution. If a 70 is the minimum passing score, then it is reasonable to require that a drawing conform to that minimum standard. Or, if you require that your students complete assignments on a pass-fail basis, a 70% successful completion rate might be required to pass the course. However, it is not appropriate to tell students that they must follow 70% of all safety rules, or that they must follow each rule with 70% accuracy. Nor is it reasonable to state that a medical technology student will locate a vein and draw blood with 70% accuracy. In some cases, nothing less than perfection will do.

Speed standards should also reflect the standards expected of workers in the field. If a typist is expected to type at least 60 words per minute, it is reasonable for you to set a similar speed standard as a goal of your instruction. If a mechanic is expected to complete a disassembly and assembly repair procedure in less than two hours, you should consider a similar expectation for your students. Speed standards should be clearly stated in your learning objectives.

Sometimes it is not necessary to explicitly state all three components of an objective. For example, to begin every objective relating to written work with the condition, "Given a pencil and paper,..." is nothing more than busy work. So too, in many cases, are efforts to precisely state evaluation standards. It is often acceptable to identify the standard using such phrases as "completely" or "in accordance with industry standards." It is also possible to specify conditions and standards that apply to many objectives in a statement preceding a list of the objectives. The key here is to write your objectives simply, painlessly, and sensibly.

Content Outline

The content outline guides the instructor through all phases of the lesson.

In outlining your lesson, you should remember that you are taking your students from the known to the unknown. Regardless of their learning style, all parts of your presentation must follow a rational, well planned approach to the subject. Fuzzy planning leads to a fuzzy lesson, which in turn leads to fuzzy understanding. You would expect a lawyer representing you to study the facts of your case, identify the legal theory on which your case would rest, prepare his or her presentation to the jury, develop a line of questioning to be used in the examination and cross-examination of witnesses, and be prepared to deal with contingencies that might arise during the trial. In short, you would not expect your lawyer to try to "wing it." Your students have the same expectation of you.

Novice instructors tend to put too much or too little information in their lesson plans. It is not uncommon for beginning instructors to write out exactly what they want to say during the lesson. This technique leads to overreliance on the lesson plan. Instructors will appear less sure of their content and will tend to read from their lesson plan. It is also common for beginning instructors to get lost or confused during a lesson, and the complete sentences make it difficult to find their place easily. Effective instructors find that an outline is the best way to include content information in a lesson plan. Rather than telling the instructor exactly what to say, the content outline merely reminds the instructor about what should be covered and in what sequence. This technique allows the instructor to "talk from experience" rather than relying on pre-prepared text.

Course Syllabus

The course syllabus is an informal contract that establishes what the teacher will provide to the students and describes the work that students must do in return.

If a good lesson plan is the tactical component of teaching, then a good syllabus is the strategic component. Not only does the syllabus help keep you on track from one class meeting to the next, it also gives your students an idea of where you are going and what route you are taking. Indeed, your students will expect to receive a comprehensive syllabus on the first night of class.

What should a syllabus include? Certainly it should include a listing of what information will be covered in each class session; the course name and room number; the instructor's name, office room number, office hours, office (and, if you wish, home) telephone number(s); the semester for which the syllabus was written; grading, attendance, and homework policies; test dates; learning objectives; and any other pertinent information that the students need to know. Most syllabi also state that the material will be followed to the greatest extent possible, but that unforeseen circumstances may necessitate changes to the schedule. Schedule changes are generally within the teacher's prerogative, but should come with plenty of warning. From the students' point of view, the guiding precept here is, "Poor planning on your part does not necessarily constitute an emergency on my part." As with any contract, you should be sure that your syllabus says and implies only those things that you are willing to live with for the duration of the course. Remember, a good syllabus not only provides an overview of the course, it communicates that the instructor knows what he or she is doing. A poor syllabus, or one that is ignored, sends the opposite message.

Recommended Reading

Bortz, R. F. (1981). *Handbook for Developing Occupational Curricula.* Boston: Allyn and Bacon, Inc.

Bortz presents a practical handbook for guiding administrators and instructors through the curriculum development process. While elements of the text are written with secondary school practitioners in mind, the information presented is applicable at any level. This book is available from the Illinois Vocational Curriculum Center at Sangamon State University.

McCarthy, B. (1980). *The 4MAT System.* Oakbrook, IL: Excel, Inc.

McCarthy presents an innovative approach to lesson planning based on students' learning styles. The book is easy to read and contains numerous examples of the principles she proposes.

Chapter 6

Presenting Lessons

The First Class

Good planning will help you arrive for class relaxed and confident.

The first class meeting is always a scary experience for new instructors, and for many experienced ones. There seems to be so much ground to cover that you hardly know where to begin. Arrive relaxed; having previously checked out the building and found the room in which you will be teaching will help a lot. When that first bit of stage fright strikes, you will begin to appreciate the benefits of pre-planning your lesson. If you are really well prepared, you will have read your opening remarks out loud to the mirror or a supportive audience, watching out for tongue twisters, looking for unclear statements, and generally familiarizing yourself with the content so that you don't find yourself wanting to read from your notes. Remember to not read from your notes! With your lesson plan serving as a map to guide you, you will be free to do what you do best — talk about your subject.

Good instruction requires that you sell yourself to your students, and the first meeting is a good time to start. This does not mean that you should try to be the students' best friend. That is probably not what they want or need from you, and it almost certainly is not what they expect. Instruction is a business transaction. As with any other transaction, the parties involved are expected to play certain roles. It is the instructor's responsibility to professionally perform his or her duties in a way that meets student, peer, and institution expectations.

You must conduct yourself professionally, and you must be yourself.

To sell yourself, be yourself. If you're putting on an act, if you're trying to be someone or something you aren't, it will show through. You are an expert in your field, and a model of what we presume your students want to become. You begin with credibility. All you have to do is be fair, be respectful, and be yourself, and you will retain it.

What do students expect of their teacher? First and foremost, they want you to be reasonable, fair, consistent, and predictable in your behavior and evaluation of their performance. This does not stand in the way of using a variety of creative instructional techniques, "rolling up your sleeves" and getting involved with the students in lab exercises, or conducting a classroom in which students feel relaxed and comfortable. Indeed, these are the very behaviors that many of your students will expect from you. You need

Professionalism does not require aloofness or stuffiness.

The structure you establish during the first meeting will carry on throughout the semester.

not be cold and stuffy towards them, nor should you be. Stuffiness and aloofness will not foster the atmosphere of mutual respect that effective instruction requires. You must, however, exhibit professional behavior and retain control of your classroom and all that goes on in it. During the first meeting you will, intentionally or not, establish a structure that will carry on throughout the course. Be sure that it is the structure you want, one that gives reassurance to older students and guidance to younger ones.

What should you cover during that initial meeting? First, introduce yourself and announce the course name and number. Give your students a few seconds (10 or so) to make sure that they are in the right place. Then, handout your syllabus and go over the main points, but don't read it word for word; the students can do that for themselves. You should have enough copies to accommodate students who come to the first class without having pre-registered. Remember that the very act of being in school will nearly overwhelm some of your students, making it hard for them to really concentrate on what you are saying. Be prepared to counter this with additional handouts that summarize important information.

Once the administrative chores have been accomplished, move right into instruction and teach for the full scheduled time. This serves three purposes. First, it lets the students know that you have something to say and that they are not wasting their time and money. Second, it clearly communicates that you take your class time seriously and that you expect others to do likewise. Third, it keeps you from losing time that could come in handy if things bog down later on in the course. There is, after all, no sense in using up your safety margin right away.

"Ice breakers" must reflect sensitivity toward your students' needs and attitudes.

Many people feel the need to use some sort of an "ice breaker" to get the class started. Others caution against using that approach, as several things can go wrong. If you are teaching a class that is pretty far along into a curriculum or that is required for majors in another area, you may find that just about everyone in the class already knows each other. The same thing can happen if you are teaching in a small town or a small school. Clearly, going around the room and having everyone introduce themselves will be a waste of time. If your goal is to learn your students' names, you might consider giving each student a sheet of heavy paper that can be folded to make a name plate and placed on the students' desks.

If you must use some sort of opening activity, be sure that you don't do anything that could put anyone on the spot. Even asking people to give their name and say a sentence or two about themselves can be threatening to some. If you decide to open with a joke or cute story, be sensitive to others' perception of what is amusing or entertaining. And watch out for openers that bring about unintended consequences. A very good English teacher once opened her class by saying, tongue in cheek, that an "A" in her

class would cost $25, a "B" $20, and so on. Everyone laughed and the joke was forgotten. After the class was dismissed one woman hung back from the group, ensuring that she would be the last student in the room. When they were alone, the woman shyly approached the teacher and explained that she really wanted an "A" but didn't have very much money. Would it be all right, the woman asked, if she gave the instructor $5 now and paid off the remainder a little bit at a time? The best that can be said for this is that the teacher had a chance to immediately clear up the misunderstanding. You may not always be so lucky.

Preparing Your Class to Learn

As has been emphasized in earlier chapters, your students will come to class expecting to learn. Most of them will be physically prepared for this task; they will have their pencils, notebooks, and textbooks. But they may not be psychologically prepared. Instead of concentrating on the subject you will be teaching, their minds may be on events that occurred earlier in the day, on past learning experiences, on the physical condition of the room and the people they see coming into the class, and on any number of other totally irrelevant factors. Getting the class ready to learn must be your first task at each and every meeting.

Students who are not motivated to learn will not learn.

Another way to put this is to say that you must motivate your students before learning can begin. The need for this is obvious: student motivation has been shown to be more important than innate ability in determining how successful an academic experience will be. Not surprisingly, then, the ability to motivate students is frequently cited as a distinguishing characteristic of good teachers.

There is no one best way to prepare a class to learn. This is certainly to the instructor's advantage, because different groups of students may need to be motivated in different ways. Groups of younger students typically need more structure and specific direction from the teacher, whereas older students may need more flexibility and a motivational strategy that takes into account their previous work and academic experiences. In some cases, you may need to blend these two extremes together to meet the needs of a heterogeneously mixed class. The most important thing is to be consistent and fair in whatever approach you choose.

Writing a course-relevant question on the board and asking the students to think about it while you are performing the necessary administrative chores will focus everyone's mind on the topic to be discussed. In subsequent class meetings, this question can be used to get students to analyze, synthesize, or perform some other higher order task using informa-

tion that was previously presented in class or covered in assigned readings. This is also a good way to motivate students to complete their assigned readings.

The psychological environment in your classroom must be non-threatening.

Instruction occurs best in a positive, non-threatening environment. Students should feel free to express ideas without fear of ridicule or embarrassment. The teacher should conspicuously care about what the students think and should respond to student thoughts and ideas in a way that makes the student glad to have voiced his or her opinion. To do this, do not respond immediately to student input. Instead, spend five to ten seconds silently considering it and then, if possible, expand upon the thought or try to integrate it into a larger framework. You can ask the same student to provide this expansion and integration, you can provide it yourself, or you can use the point as a means of getting other students involved in the discussion. The focus of this technique is to encourage students to put their emphasis on creative problem solving approaches, rather than on trying to divine a "right" or "wrong" answer.

The physical environment must also be conducive to effective instruction.

Maintaining a good physical learning environment is important, too. Beyond a few basic modifications, however, there is really very little that most part-time instructors can do about the condition of the room. Unless you can make arrangements with the instructor(s) who normally teach there, making changes in the location of major pieces of furniture, bulletin boards, and other physical features may be out of the question. This makes the few things you can do all the more important. Be sure the room is clean when the students arrive. The board should be completely erased. Desks should be orderly, in whatever arrangement you choose (a semi-circle, rows and columns, etc.) and free of paper and other trash left over from previous classes. The floor, too, should be free of debris. If this is a continuing problem, check with the previous instructor or the department chair to find out what can be done to improve the situation. It is often hard for students to respect the physical and intellectual integrity of a program that takes place in a sea of disorder.

Delivering Instruction

Effective instruction requires a proper mix of teaching methods.

Even if your course is well planned, your instruction may not be as effective as it can be. Teachers typically rely on only one or two teaching methods. However, we know that students learn in many different ways and that adults have different expectations in learning situations than do students in their late teens. To accommodate the differences in learning styles among individuals, teachers must use a variety of teaching methods. It is your responsibility to review the objectives of the presentation, and choose the

technique, or combination of techniques, that will do the best job of meeting those objectives. The main strategies, from which most others are derived, are lectures, discussions, questioning, demonstrations, structured exercises, simulations, case studies, and cooperative learning.

Lectures

Lectures give large amounts of information to large groups of learners. Used alone, their impact is limited.

Lectures are the most common and possibly least effective teaching method. They are formal presentations of information used to impart large amounts of information to a group of students. Their main drawback is that they essentially provide one-way communication. Because they allow little or no opportunity for dialogue between the teacher and the students, the teacher must be able to rely on a dynamic speaking style to keep students involved in the lesson.

Advantages of the Lecture Method:

- Keeps group together and on the same point. You have complete control over both the content and the sequencing of the information.
- Covers a large amount of material in a short time.
- Time control is easy.
- Useful for large group sizes as long as you can be seen and heard.
- Is a familiar method to students.
- Can easily be recorded for future review.
- Can be used in limited physical facilities.

Disadvantages of the Lecture Method:

- Often involves only one-way communication.
- Students are often passive learners.
- Effective lecturing is a difficult skill to master.
- Can be dull if used too long without learner participation.
- Can be inappropriate for practical subjects such as learning skills.
- Difficult to gauge if people are learning.
- Retention is limited.

If you are in a situation where you must rely primarily on your speaking ability to retain student interest, you must adhere to three principles. First, you must be thoroughly prepared so that you can present the lesson without reading from your notes or the book. It is extremely important to speak in a conversational tone. Second, you must vary your

inflection, volume, and cadence to keep from putting your audience to sleep. Finally, you must maintain eye contact with the students. If you are gazing off into the back of the room or at the floor or the ceiling, it will seem that you are disengaged from the presentation. This is a sure way to disengage your students, too. A lecture format inhibits student input; therefore, you must make students feel that their questions are of value.

Characteristics of a Quality Lecture:

- Objectives and purpose are well understood.
- Topic and language are relevant to student's prior knowledge.
- Well organized.
- Satisfactory pace of delivery.
- Instructor's voice can be heard by all students.
- Takes place in a comfortable environment.
- Instructor is sensitive to student needs and adjusts accordingly.
- Instructional media is used to enhance the lecture.
- Questions are used to check for understanding.

A lecture must answer questions that students may not have a chance to ask.

Because it is difficult to get students to expand on a point during a formal lecture, you must assume this responsibility yourself. Be sure to leave plenty of time at the end of the session to field questions from students and answer them thoroughly. Depending on the particular situation, you should plan to spend a few minutes after class each night answering questions for students who were unwilling or unable to bring up a point during class. If your explanation of a point seems to be generating a lot of basic questions, you probably need to step back and determine why your message did not get through. Carefully questioning your students to understand their perspective is often helpful. It is a sure bet that repeating the same ineffective explanation over and over again will not clear up the misunderstanding.

Hints for Lecturing:

- Identify the exact purpose of the lecture.
- Write out the introduction.
- Get the students' attention before beginning the lecture.
- Be sure to clearly state why this is important for the students to learn. How will this help them do their job better?
- Use an outline for the body of the lecture.
- Use questions frequently to check for understanding.
- Prepare a summary in advance.

Many instructors use the lecture method when it is not called for, because it makes them feel like they are "teaching." They view themselves as disseminators of knowledge and view the perfect class as a situation in which students learn effectively and efficiently by hanging on and absorbing each word of wisdom that drops from the teacher's mouth. Students, however, rarely subscribe to this view. Seeking to be engaged in the learning process, they instead often find an instructor who seems overly fond of listening to him or herself talk.

Discussions

Discussions are essentially lectures that encourage interaction between the teacher and the students, and among the students.

Discussions are a powerful teaching technique if the group remains focused on the proper topic.

The discussion method retains the configuration of the teacher standing in front of the class talking, but also encourages responses from the students. This technique is an excellent alternative to lecturing when there are under 20 students in the class. Many of the principles for conducting a good lecture still apply: the instructor should vary his or her voice, should maintain eye contact with the students, and should not read from the lesson plan or other notes. Beyond that, however, points should be made in a way that draws students into the discussion and sets the stage for them to progress from point to point during the dialogue. A key point in conducting a discussion is to not allow a student or small group of students to monopolize the conversation.

Advantages of the Discussion Method:

- Provides every student the opportunity to participate.
- Pools the abilities, knowledge, and varying experiences of the class.
- Can be highly stimulating and motivating when properly planned and organized.
- Keeps learners interested and involved.
- Learner resources can be discovered and shared.
- Learning can be observed.

Disadvantages of the Discussion Method:

- Can turn into an aimless debate unless it is properly organized and controlled.
- A few students may dominate the discussion.
- Effective discussions are usually limited to a small group of people. Seven can be considered optimal.
- Important points can be confusing or lost.
- Time control can be difficult.
- Can be a time-consuming activity.

Questioning

One factor in leading effective lectures and discussions is your ability to question your students. Most instructors simply ask, "Are there any questions?" This type of question rarely generates a response. Rather than asking general questions of the entire class, you should ask specific questions, wait several seconds for students to think about the question, and then call on a student by name. This technique motivates all of your students into thinking about how they will respond if called on and also provides a way for you to check their level of understanding.

Low-level questions evaluate content knowledge.

High-level questions encourage students to use more sophisticated thinking skills.

You can ask several different types and levels of questions during instruction. These can be divided into low- and high-level questions and open and closed questions. *Low-level questions* are usually appropriate for evaluating student comprehension, diagnosing their strengths and weaknesses, and reviewing or summarizing content. Generally, they only require students to recall or reiterate something that has been covered in a lesson. *High-level questions* are usually appropriate for encouraging students to think more deeply or critically, to problem solve, or to stimulate students to seek more information on their own. *Closed questions* are ones for which

Closed questions have a limited number of acceptable responses.

Open questions have a much wider range of possible responses.

there are a limited number of acceptable answers, most of which can be anticipated by the instructor. *Open questions* are ones for which there are many acceptable answers, many of which will not be anticipated by the instructor.

Following are examples of each of the types of questions you can use during instruction.

- In what year was the transistor invented? (Closed Low-level)
- What is an example of an adjective? (Open Low-level)
- Given the medical data before you, would you say this person is intoxicated or suffering from a diabetic reaction? (Closed High-level)
- What are some ways we might solve the energy crisis? (Open High-level)

Most instructors are not very good at questioning. However, questioning is a skill that can and should be developed. The following hints can help you improve your ability to ask good questions.

Hints for Effective Questioning:

- Include questions in your lesson plans.
- Avoid questions which can be answered with a YES or NO unless you intend to follow with more questions.
- Avoid the "guess what I am thinking" questions (20 question game).
- Phrase questions so they are clear to the students.
- Be prepared to break your question down into simpler questions if students cannot answer correctly the first time.
- Be sure that your wait time exceeds ten seconds after asking a question.
- Be aware of your facial and body gestures as you ask/answer questions.
- Call on students by name.
- Maintain eye contact with the student answering the question.
- Listen to student answers without interrupting.
- Repeat or paraphrase answers.
- Provide positive reinforcement for correct responses.
- Be tactful when dealing with incorrect answers. Students often do not appreciate cynicism or irony at their expense.
- Use probing questions.

Demonstrations

Demonstrations blend instruction and modeling.

A demonstration is really an illustrated lecture that involves showing students a process or series of actions. To conduct a good demonstration, you must model the skills you want your students to gain.

Advantages of Demonstrations:

- Addresses several learning modes including visual and verbal.
- Aids understanding and retention.
- Stimulates students' interest.
- Can give students an expert model to follow.
- Pace is flexible and can easily be altered to fit the needs of the students.
- Can be repeated as many times as necessary.
- Relates principles taught in the classroom to real world situations.

Disadvantages of Demonstrations:

- Must be done accurately and be relevant to students.
- Demands very careful preparation and organization. If things go wrong, the effect is lost.
- Demonstrations may be difficult for all students to see well.
- Must be limited to small groups.

An effective demonstration involves student input.

When giving a demonstration it is good practice to ask students what the next step should be rather than simply doing it yourself. Also, be sure that you explain why each step is necessary and why the steps should be done in a particular order. Do not overly embellish the narrative, but do not rush through your explanation, either. Learning is a process that is often slow and always improved by allocating enough instructional time to allow information to be absorbed and built upon. Other things to consider when presenting a demonstration include:

- Practice privately prior to the demonstration.
- Be sure the class is ready for the demonstration. Relevant information should be covered prior to the demonstration.
- Show and explain the procedure by going through the process step by step.
- Perform the demonstration slowly enough so that students do not miss key points. Emphasize special techniques for doing a good job.
- Be sure to explain new terms.

- Talk to your students, not to your equipment.
- Make the demonstration visible to all students.
- Emphasize safe practices as you proceed. Do not show "how not to do it." Use only the correct practices during the demonstration.
- Set up standards of quality. Show the best possible way of doing the procedure. Show one way of doing it; the way expected on the job.
- Use common tools and equipment. Do not use only the best and newest tools for the demonstration.
- Question your students throughout the demonstration to ensure their understanding of each step and to get them to think through the job.
- Watch for non-verbal clues from students indicating how well they are following or responding to the demonstration. Blank expressions, glances at the clock, or perplexed expressions tell you that you are not getting the message across. Recapture their attention and repeat portions of the demonstration if necessary.
- Encourage your students by showing how easy it is to perform difficult manipulative jobs when they are done properly.
- Ask summarizing questions. Do not simply say, "Are there any questions?" Plan specific questions to ask that require students to respond in such a way that you will get feedback on how well they understood the demonstration.

Structured Exercises

Structured exercises incorporate both guided and independent practice into classroom exercises.

Structured exercises are an opportunity for your students to practice the skills they have been taught through another teaching method such as lectures, discussions, or demonstrations. This method includes both "seat-work" and lab activities with a heavy emphasis on *guided practice*. Many instructors seem to be of the opinion that lab time and in-class assignments are an occasion for them to do other work and allow the students to go their own way. This runs counter to good instructional practice and cheats your students out of the full value of their education. You must be available to your students to offer the least intrusive guidance possible and still keep them both "on task" and on track toward successfully completing their task.

Advantages of Structured Exercises:

- Aids retention.
- Allows practice of new skills in a controlled environment.
- Learners are actively involved.

Disadvantages of Structured Exercises:

- Requires preparation time.
- May be difficult to tailor to all learners' situations.
- Needs sufficient class time for exercise completion and feedback.

"Least intrusive" is an important standard for teachers to maintain. We have all known teachers who control their classroom so thoroughly that no one dares do anything without asking permission first. While this is important in certain aspects of some fields (most notably the health care field), it does not foster higher-level thinking skills and a sense of self-assurance. Mistakes are an important part of learning and, with the exception of those that endanger the student or the equipment, are to be expected. Allow for them, and let students know that it is all right to make a mistake as long as it is corrected.

Simulations

Simulations allow students to role play in real-life situations.

During simulations students are given information about a situation and are asked to perform as they would if it were a real-life event. There are many types of simulations for postsecondary career and occupational programs. Hardware-related simulations are common in avionics and maintenance programs where students can practice a series of tasks on a simulator. In-basket simulations are appropriate for learning skills needed in the business occupations. This type of simulation can involve giving students all the paperwork they might expect to see in a typical day. Their task is to work through and process the paperwork until it is all completed. Role plays are a form of simulation which permits students to reenact situations which they face on the job or in the future by acting out a situation or incident. Role plays are especially effective for changing attitudes and beliefs.

Advantages of Simulations:

- Can provide real-life experiences.
- Can simulate performance required after teaching.
- Provides the opportunity to experience hazardous or difficult settings.
- Can be very motivating and fun.

Disadvantages of Simulations:

- Can be expensive.
- May be viewed as a game and not a learning experience.
- May fail if proper planning is not done.
- Can be boring and dull.
- Can be very difficult and time consuming to develop quality simulations.

Case Studies

Case studies provide guided practice and encourage higher order cognitive skills.

A case study is a special form of simulation where students are given information about a situation and are directed to come to a decision or solve a problem concerning the situation. Students are asked to work either independently, in small groups, or as a class to devise responses or solutions to the problem, based on the principles being discussed in class. Case studies usually relate to real-life situations and reduce the tendency of instructors to avoid real issues by talking about theory rather than its application. Frequently, the major outcome of a case study is some type of product such as a recommendation, a decision, or an action plan. Case studies are especially useful when the nature of the problem or equipment or logistical limitations make a hands-on laboratory experience impractical.

Advantages of Case Studies:

- Requires active student involvement.
- Learning can be observed.
- Is often a fun learning activity.

Disadvantages of Case Studies:

- Information must be precise and kept up-to-date.
- Students can become too interested in the case content.
- Is very difficult and time consuming to develop quality case studies.

Case studies provide students with an opportunity to be involved in the learning process by reasoning out information that they need to arrive at a conclusion. Case studies can be very powerful if you have students who are capable of the mental activity required and if you have provided enough clues to make a conclusion possible. If either of these conditions are not met, the method will only frustrate your students. Therefore, it is very important to include as much information about a case as possible.

A case study is usually structured around a conflict situation in which the following elements are emphasized:

1. **Facts**. Basic background facts must be identified. Although some instructors prefer to introduce extraneous facts and conditions for the purpose of making cases more realistic, most instructors limit their cases to the essential facts.
2. **Feelings**. An especially important aspect of a case study is the consideration of important feelings involved. The feelings of each of the parties in the case toward the problem must be portrayed as clearly as the facts.
3. **Relationships**. Basic to every case are important human relationships. A desired course of action frequently cannot be taken due to conflicts between important parties. Case materials must clearly show such relationships. The case must portray a realistic situation for the students. Therefore, the problems investigated in the case studies must be of immediate concern to the students.

Case studies should be as realistic as possible. Because real events take place according to a certain time sequence, you need to make this time sequence clear to your students. To develop interest, you may wish to take as a starting point a recent event in the actual sequence, and show the early origins of the situation through a flashback. There must also be a *flow* to your story. The events that happened and the circumstances of their happening must be narrated in some kind of understandable pattern. Your students will not have the same insights about the case as you do, so describe the problem in specific terms. You can ensure sustaining student's interest in the case study if you also build up a sense of drama about the problem to be solved. The following three steps should be followed when writing a case study:

Case studies should involve real-life issues, and can be written to include some or all aspects of a problem.

Step 1. Briefly describe individuals to be considered along with their role identification. Included in this paragraph should be a statement of the basic issue.

Step 2. Give background information (facts and feelings) concerning individuals and the situation.

Step 3. Explain any additional developments concerning the issue, and culminate with a final statement or paragraph that will portray an impending decision and/or raise specific questions.

The case should be first written in rough draft form from the basic information available to you. You should then write an analysis and solution of the case as if you were assigned that case as a student. This analysis and solution should be as thorough as possible and should be based on the case itself and not on other things you know about the problem. This will help to highlight any lack of clarity of expression or omission of relevant data from the rough draft. You can then put the case in final form.

Cooperative Learning

Cooperative learning is a technique that is used from time to time to enhance content and process knowledge and teach group work skills.

Cooperative learning is a technique that uses many of the teaching methods previously outlined. Cooperative learning encourages students to work together in a controlled, supportive environment. Before going on, one important point must be made: cooperative learning is not a technique that you will want to use all the time. There are situations where students should, and must, assume independent, individual responsibility for learning, applying, and demonstrating mastery of the material being covered in class. Yet the idea that students need to learn to work cooperatively is equally unassailable. Indeed, this is one area that business leaders identify as needing more emphasis in the schools.

What are the crucial elements involved in bringing cooperative learning into the classroom? First, students must be made to realize that competition is not always advantageous or even desirable. Rather, they need to be aware that groups of mutually supportive individuals can often work together to reason, solve problems, and learn more efficiently than can people working alone. The words "mutually supportive" are extremely important here. A group that ostracizes some of its members, or that is dominated by one or two members, is not efficiently utilizing its potential. Instead, group members must be willing and able to keep any individual or faction from overwhelming the groups' cooperative focus. They must also be willing and able to draw reluctant participants into activities.

Well constructed cooperative exercises can retain individual accountability.

Certain specific instructional techniques can help make cooperative learning experiences successful. One technique is to make groups jointly responsible for the learning that must be demonstrated by each person in the group. For example, assume that you are teaching a data processing course, and you want your students to learn to alphabetize files using a word processing software package. You might split the class into groups, and charge each group with being sure that each member can correctly run the software package by the end of a certain period of time. At the end of the time

period, each person would be tested on their ability to run the program, with some portion of each member's grade being based on how well every group member performs. By setting up the lab activity in this way, you will accomplish several goals. First, you will give students who master the skill quickly a chance to reinforce their learning by teaching slower students. Teaching someone else is a very effective way to reinforce your own learning. Second, using faster students to help with instruction will let you simultaneously provide individualized instruction to many slower learners. Finally, you will keep every one in the class, regardless of their ability level, "on task" throughout the class period.

Grades can be based on both individual and group performance.

Another cooperative learning technique is to offer grades or rewards based on the achievement of the group as a whole. Group projects are the most obvious example of this approach. To avoid the problem of having to assign one grade to everyone, regardless of individual effort, you might consider having the group assign specific sub-components of the activity to each member. An individual grade and a group grade can then be assigned, with the two components weighted in whatever proportion suits the needs of the class.

Cooperative learning can enhance an instructor's power and control.

Despite its instructional benefits, some instructors do not incorporate cooperative techniques into their lessons, because they feel it diminishes their power. Certainly, it does de-emphasize the teacher's role as a provider of knowledge. But this is not necessarily bad. One of a teacher's responsibilities is to make him or herself obsolete, to teach students to work things out for themselves. Cooperative learning is a way to teach students to form the support structure that makes this possible. Viewed from that perspective, cooperative learning actually makes the teacher more powerful, because it adds a whole new level of learning to the skills that are being gained in his or her classroom.

There are two major possible pitfalls in cooperative learning. The first is that the students will become too group oriented, thinking of themselves as a team, rather than members of a larger unit who can come together in a variety of combinations to work together. To avoid this problem, do not allow groups to become static. Using your sense of judgement, split up and reassign some or all groups when they seem to be forming too cohesive a group.

A second potential problem can result from an instructor getting lazy and relying on groups to do the teaching. Cooperative learning does not reduce an instructor's work any more than it increases it; it simply changes what the teacher does. Instead of lecturing and demonstrating continuously, the instructor provides basic guidance to the group and then circulates among the groups, observes their progress, encourages them to work cooperatively to solve problems, and intervenes in the least obtrusive way

possible when intervention is required. The instructor is not an ex officio member of each group. Instead, he or she is a "facilitator" who is helping students learn to work through assignments on their own.

Selecting Appropriate Methods

The teaching method you choose must be appropriate to student needs and lesson objectives.

With so many types of teaching methods available, how do you know which one is best for a particular lesson? Three general criteria must be taken into consideration when selecting methods for your teaching. First, you must think about the learning objectives of your lesson. What are the learner outcomes? Does the lesson deal with developing understanding, skills, or attitudes? Does one method ensure reaching the objectives better than another? If you are teaching for understanding you will find lectures, case studies, and demonstrations effective. If you want your students to be able to do something new as a result of your teaching, demonstrations, role plays, and structured and lab exercises are appropriate. If you want to change student values and priorities, you can help them inquire and observe the old versus the new using role plays, case studies, and structured exercises. For all of these objectives, you might consider using cooperative learning techniques.

You also need to think about the types of students you are teaching. Some methods such as lectures and demonstrations are more appropriate for students who have little previous experience in the subject you are covering. Other methods such as discussion and case studies are very effective for students who have considerable experience.

Finally, several practical considerations must be taken into account when choosing teaching methods. You need to take consider the class size, the amount of noise and lighting in the class or lab area, the types of equipment, tools, and instructional materials available for instruction, the amount of time available (both preparation and classroom time), and any cost limitations you might have. A reasonable rule of thumb for instructional group size is:

Large Group Lectures	40+ people
Traditional Lectures	10 - 40 people
Classroom Instruction	5 - 15 people
Demonstrations	3 - 10 people
Discussion Groups	3 - 7 people

It is important to realize that most instructors use only one or two methods of teaching. Whatever methods you choose, please keep in mind the following recommendation: use a variety of teaching methods. Not only will your students be more attentive in class, but you will more effectively address the different learning styles of your students.

Using Teaching Aids

Students learn best when they are involved in the lesson in as many ways as possible. Pure lectures typically only involve the student aurally. That is, they learn only by hearing. If they take notes, the lesson is reinforced as key points are written down. Further reinforcement occurs when the student studies those notes.

The problem with this system is that the teacher has no control over what the student is writing down. You can do certain things that will greatly improve the chances that your students will take "good" notes. These include stating the objectives clearly, talking slowly, pausing frequently, trying to present the material in a manner that will be logical to each student, and providing frequent reviews of important points. If you write key words and points on a chalkboard or other medium, you have much more control over the situation. Students are now involved aurally and visually, and there is no ambiguity over spelling.

Information written on the chalkboard should be orderly and legible.

When using a chalkboard you must keep in mind the distinction between the stereotypical instructor who dashes back and forth scribbling cryptic messages and the true teacher who organizes material in a logical manner and writes legibly. Check with your students before you erase what you have written on the board, and be sure that when you do erase something, you erase it completely. It is poor practice to write out large amounts of information on the board and expect your students to copy it. Not only is it discouraging for students to see a board full of information when they walk into the room ("We don't have to copy all that, do we?"), it also prevents them from developing a sense of involvement with what is written. Some instructors say that writing out information on the board in advance of the meeting saves time, but this argument is not really valid. Writing the information as you go does not take any longer, because you have to give your students time to write it down, too.

Generally, material should be written on the board as it is presented rather than before class begins.

There are three obvious exceptions to the rule of not starting class with things written on the board. The objectives for the class should be prominently displayed for students to read as soon as they walk into the room. Also, complicated diagrams or graphs should be drawn in advance to help ensure that they are of the highest quality possible. Colored chalk can be used to emphasize elements of what you put on the board. Poor artists can improve their drawings by using an opaque or overhead projector to project the image onto the board and then tracing it. If you can do this, though, you might consider just using the projector and giving up on the chalkboard. The rules that apply to chalkboards also apply to overhead projectors. When you are writing material by hand, it is usually best to write it as you go. There are two competing philosophies regarding the use of

The rules that apply to chalkboards also apply to overhead projectors.

prepared transparencies. One theory holds that you should cover the parts of the transparency that you have not yet gotten to, uncovering them as you go. In this way, students are not distracted or confused by points that have not yet been made. The other theory is that covering up blocks of information is a huge distraction that makes students wonder both what secrets you are keeping from them and when the other shoe is likely to drop. The choice is yours, based on how your class seems to respond to each approach.

Some students may need help getting a good set of notes. Handouts can be helpful in these situations.

Despite your best efforts some students may, for a variety of reasons, be unable to get a good set of class notes. Giving each student a handout that includes the lesson objectives, new words to be learned, and a rough outline of the lesson can give note taking the structure that many students need. It also frees them from the drudgery of copying a lot of material from the board, allowing them to instead concentrate on writing down personalized interpretations of higher-level concepts. You should be aware that some colleges hire students to take notes for other students who, for some reason, cannot take notes themselves.

Handouts covering specific points that a student should get from a lesson are also useful when showing a video or filmstrip. Presentations using these media are often very useful, but can be ineffective, because watching a movie is a passive activity that must be converted into active learning. To do this, audio-visual presentations must be followed by discussions that tie the presentation directly to the objectives of the class.

If you are teaching a process that involves the use of a computer, check with your department and/or the media center or library to see if a computer-overhead projector or computer-television interface is available. These devices project what appears on your monitor onto a projection or television screen. This makes computer demonstrations much more effective than when the whole class is crowded around a single monitor watching you work.

Homework

One of the greatest complaints that vocational-academic integration and other curriculum reform measures elicit from instructors is, "I just don't have time to do all of this." And sure enough, trying to fit so many more things into a business-as-usual schedule will not work. The real issue is, how can you change the instructional process to meet an expanding set of demands during a fixed amount of class time?

Assigning homework is a sound instructional practice that reinforces teaching by providing independent practice.

One approach is to make more effective use of out-of-class time. By assigning out-of-class readings that introduce new topics, less instructional time will be expended reviewing fundamental information. Assigning

Homework allows for more effective utilization of in-class time.

readings, worksheets, problems, and other reinforcement activities as homework instead of doing them in-class, instructional efficiency is also enhanced.

Assigning homework is sound instructional practice. In fact, homework is one of the most obvious means of providing students with an opportunity for individual practice of what they have learned. However, there is an important limiting factor that must be taken into account: your students do have lives outside your class. As such, they have a limited amount of time to devote to your assignments. Homework must be given in reasonable amounts. How much is too much? This varies so widely that it is impossible to make a specific recommendation.

Students will not respect homework assignments that are not graded carefully and calculated into their course grade.

To make homework assignments effective, you must incorporate them into your instructional plan in a way that encourages students to take them seriously. This can be done by giving a short homework assignment at the end of each class meeting and collecting it at the start of the next session. At the same time, the assignment you collected at the start of the previous session should be returned with a grade and appropriate comments. If you expect your students to put effort into the homework, they should be able to expect you to put effort into its evaluation. Further, the reward for doing the work must be comparable to the effort it takes. Basing 20 to 25% of the course grade on homework is not unreasonable, provided that you have taught the students how to complete the assignment and provided them with any help they need. Just because you are ready to assign independent practice exercises does not necessarily mean that everyone is ready to move on to that level.

In addition to reinforcing instruction and providing a valid means of measuring student achievement, homework also serves an organizational purpose. Analyzing the answers students give you can pinpoint topics that need further instruction, either on a large group, small group, or individual basis.

Recommended Reading

Miller, W. R. (1990). *Instructors and Their Jobs*. Homewood, IL: American Technical Publishers, Inc.

Miller describes both the instructional process and how instructors fit into that process. This very readable text provides numerous examples, review questions, and suggested activities that will help both beginning and experienced teachers.

Chapter 7

Classroom Management

Preventing Problems

Most community college students are motivated to learn.

At the community college, instructors start each class with a tremendous advantage: most of their students are motivated to be there. Granted, the source of the motivation may vary widely among your students, but it is there. Your first approach to preventing problems in the classroom, then, should be to make the most of this motivation. We have already seen how recognizing and accommodating students' learning preferences can help keep students involved in your lessons. It stands to reason that students who are appropriately involved in the instructional program seldom present discipline problems.

Learning brings about change, and people respond to change in different ways.

Almost by definition, education brings about change. Some theorists believe that this change is primarily evidenced by enhanced cognitive abilities; others argue that behavioral changes are most important. In either case, though, learning does bring about change. According to Sternberg's "Triarchic Theory of Intelligence," people accommodate change in one of three ways: by adapting to and accepting the change, by opting out of the environment that causes the change, or by modifying the environment to control the change. Adapting is pretty straightforward and passive -- change, regardless of its source, is acknowledged and accepted. Opting out occurs when a person decides that he or she can no longer function in the environment and leaves it for another. For some, there is a third alternative: modifying the environment so that it suits their needs.

It is reasonable for you to expect your students to adapt to and accept the changes caused by learning.

Your hope, of course, is that your students will take the first path, adaptation and acceptance. This is a reasonable expectation on your part for two reasons. First, the students are there to learn, and therefore change. Second, our social norms generally dictate what is and what is not appropriate behavior. Peer and institutional sanctions stand ready to correct serious deviations from these expectations. None the less, it is quite possible for an instructor to unwittingly create a situation where students feel compelled to either drop the class (changing environments) or try to modify the classroom environment to suit their own perceived needs.

Not all student decisions to opt out of the environment by dropping a class are the result of an instructor's actions or inactions. Scheduling conflicts (both school-related and personal), financial considerations, employment changes, family obligations, and any number of other factors can cause a student to drop a class. Still, there are some things that instructors do that literally drive students out of the room. The first of these is arriving for class unprepared. Students are investing both their time and their money in the classes they take, and they expect a good return on their investment. Instructors who cannot communicate a sense of professionalism, purpose, and direction do not give students confidence that they will receive the return they seek.

It is essential that you establish and maintain an atmosphere of mutual respect.

Many students place a considerable amount of self-confidence on the line when they sign up for a class. In addition to being competently directed on their journey through unfamiliar territory, they expect to be treated with respect and dignity and not put "on the spot" by the instructor. This is an area that requires great sensitivity on the teacher's part. What seems like an insignificant episode to one person can be an embarrassing experience to another.

The area of respect is so important that it needs further discussion. You can never forget that respect is a two-way street. Civility, politeness, and understanding are key elements of respect and must be given by the instructor if they are to be received from the students. Do not confuse submission with respect; they can be very different things.

Not treating all students equally will inevitably bring about unnecessary problems.

Treating your students unequally is a sure way to communicate that you do not respect them. Age, race, sex, appearance, maturity level, and personality are all irrelevant factors in classroom interpersonal relationships. Every one of your students must be given equal opportunities to succeed, must be held to equal minimum performance standards, must receive equal sanctions when performance expectations are not met and receive equal rewards when they are. There are, of course, some situations where performance standards must be modified for students with special needs. These modifications, however, are made out of respect for a student's special requirements.

Appropriate professional conduct and teaching techniques can reduce the number of students who respond to change by dropping out.

Maintaining a professional interpersonal relationship with your students is a crucial part of maintaining good order in the classroom. This is not to say that your students cannot also be your friends. Friendship is a natural and acceptable consequence of interaction among individuals. However, you must insure that these friendships do not influence the way you do your job. You cannot allow yourself to instruct or evaluate some students differently than others in order to gain or maintain friendship. Doing so is inevitably detrimental to you, your students, your reputation, and your instructional effectiveness.

Your students look to you for information, not value judgements.

Remember, too, that your job is to present students with a specific body of information and then allow them to make appropriate value judgements within the context of the value system held by the profession for which they are being trained. It is usually not your responsibility to make these judgements for the students, or to tell them what judgements they should make. Indeed, like a news reporter covering a political event, you should probably not even make your position known to the class. In some cases, such as the health care areas, this discussion is not applicable. In these fields, transmitting certain values is an important part of the instructional program, and a faculty member would be remiss if he or she did not seek to instill those values in its students. But this is an unusual case. Generally, trying to impose your beliefs on a class as part of the instructional process only leads to anger, dissent, and instructional disarray.

These are all things that can drive students out of the classroom, provided that leaving is a viable option. But if you are teaching a required class, your students may not be able to leave. Students who need to maintain a specific credit load and lack other course options may also be unable to drop the class. In these cases, you may find that you and a student who does not want to be in your class are stuck with each other. Or, despite your best efforts to create a proper environment, you may find that you have a student who seems bent on causing problems. If the problem rests with your improper conduct of the class, you can recognize and correct the problem. If you have a recalcitrant student, other measures are called for.

In many cases students who cause problems do not mean to be disruptive. For these students, a quiet, private, non-confrontational conference that is centered on a factual description of their inappropriate behavior and the problems it is causing will solve the problem. Saying something like, "Bill, I enjoy having you in class, but some of the things you do are disrupting. When you make comments out loud you interrupt me and break the other students' concentration. I'm glad that you want to participate, and I think you have a lot to offer to the class. But I'd like for you to raise your hand when you have something to say. If I don't call on you immediately, it doesn't mean that I'm ignoring you. It's just that I need to finish making my point. Then I'll call on you and you can make your point, too," is likely to be much more effective than standing in front of the class, pointing at Bill, and saying, "Son, I've heard enough out of you today." In every case, discussions about behavior should be held in private.

If you are faced with a discipline problem, remember that you are the one in control. It is your responsibility to keep the situation as non-confrontational as possible and to leave the student a way to "save face."

It is important that you leave a student who has been disciplined with a way to "save face" and that you always conduct yourself in a thoroughly professional manner. In the heat of the moment this can be very hard to do, but that is precisely when it is most important. It is especially important to be firm without raising your voice. Trying to out-shout a student is

particularly counterproductive. Not only are you likely to lose, but you will degrade yourself in the eyes of the rest of the class by allowing a misbehaving student to drag you down to a similar level of misbehavior.

If a student does begin shouting, let him or her say what he or she wants to say, then quietly ask the student to leave the room until he or she can regain composure. Throughout the episode, be sure that you maintain your composure. Having someone get upset rarely constitutes an emergency in and of itself, but a lack of discretion on your part can turn it into one in a big hurry. Your main focus must be on resuming the instructional process.

When handled properly, discipline problems can lead to unexpected positive benefits.

When you ask an upset student to leave, he or she will probably be glad to go and may not return during that class session. But don't be too surprised if the same student reappears the next week, ready to get to work. In fact, these situations can sometimes turn out to be beneficial. It may give you an insight into the problem that led to the outburst. Many times pressures that begin outside the classroom manifest themselves in the classroom. A little compassion and counseling on your part can go a long way.

Controlling Emergencies

The most common emergency you are likely to face is dealing with a student who is injured during a laboratory activity. Naturally, the severity of the injury will largely determine the specific steps you take. In general, though, the most qualified person in the class should administer first aid while someone else calls the rescue squad. You should check with your department chair to find out the specific procedure you will be expected to follow. It is also a good idea to find out who in your class is capable of administering first aid in the event those skills are needed. The first night of class is a good time to get this information.

In an emergency:
1. Get help
2. Act within your skills
3. Keep your safety, and your students' safety, in mind
4. Make a prompt, complete report to your supervisors

There are four additional first aid points that need to be discussed. First, know where the nearest telephone is located, and be sure that everyone in the class knows, too. In an emergency, seconds count. Depending on your college's phone system, you may need to keep a quarter in your pocket to pay for the call. Second, be sure that you do not exceed your first aid skills, and never do anything that is not easily reversible. That is, do not do anything that competent medical help can not quickly undo, if it turns out that you did the wrong thing. Examples of this include not giving any medication and not massaging or pulling a limb to reset a broken bone or dislocated joint. Third, be sure that you take your personal safety into account whenever you are likely to come into contact with an injured person's bodily fluids. Finally, be sure to complete the appropriate paperwork and file it with your department. Accident reports are essential for dealing with insurance

matters and would be primary evidence documenting your actions, should legal action be brought as a consequence of the accident.

Incidents that cause damage to college property, including the building and the equipment, must first and foremost be evaluated in terms of potential harm to individuals. You must ensure that these accidents, which mainly include fires and explosions, have not caused anyone harm. Often this will require that you account for your students immediately and accurately. This, in turn, usually requires that you have your class roster available at all times. As with personal injuries, contact the appropriate emergency personnel immediately and report fully to your department chair or other appropriate administrators as soon as possible.

The odds are extremely good that you will never encounter any sort of emergency at your school. Nonetheless, it is good practice to be prepared in case something does come up. If this preparation happened to include a basic first aid course, or even an advanced one, it would be to your benefit. In dealing with any emergency, remember that it's not what happens that's important, it's how you react.

Recommended Reading

_____, *Performance-Based Teacher Education Modules, Category E: Instructional Management.* Athens, GA: American Association for Vocational Instructional Materials.

The nine publications in this series cover a variety of topics directly related to maintaining an effective learning environment. Areas of particular interest include safety and laboratory maintenance. These publications are available from the Illinois Vocational Curriculum Center at Sangamon State University.

Chapter 8

Evaluating Learning

Evaluation Basics

Evaluations may be informal or formal.

Evaluation is an important part of our lives. We are accustomed to evaluating people and things and having others evaluate us. This is usually an informal process in which we observe and pass judgement based on criteria we think are important. In teaching, informal evaluations are frequently used to answer spontaneous questions and to give students immediate feedback on their work. The criteria used in informal observations is often ill-defined, and the evaluation results tend to be phrased in equally murky ways. Corrective feedback, the act of telling a student that she is doing an "excellent" job on a lab assignment, or that her answer to a question is "good," gives students both encouragement and a means of evaluating themselves. Similarly, telling a student that his work is "poor" lets him know that he is not meeting your expectations. Such criticism becomes especially useful when the student is told why the work is poor and what he can do to improve it. Informal assessments are an important part of the educational process, because they can inspire students to continue working hard, to continue participating in discussions, to improve their performance, and to discontinue undesirable behavior. These assessments also help the instructor identify and correct misunderstandings as they occur, rather than letting them develop into larger, more intractable problems.

Informal evaluations are often spontaneous.

Constructing formal evaluations requires a much higher level of effort and skill.

Formal evaluations are an altogether different type of performance assessment. Because they generally tend to quantify their results in a much more specific manner, the design, administration, and assessment of formal evaluation instruments (tests, observation forms, surveys, etc.) are extremely crucial processes. An instructor who cannot competently write, administer, and grade tests and assignments has no defensible mechanism for assigning students' grades. Without an effective testing and grading process, it is impossible to assign grades fairly.

Criterion- and Norm-Referenced Evaluations

Formal evaluations can be classified as either criterion-referenced or norm-referenced. Criterion-referenced evaluations are used to identify what a person knows or can do. This type of evaluation is used by instructors who are interested in determining how successful students have been in mastering course content. Students are measured according to a predetermined standard, or criterion, such as a learning objective. Those who are ready for advanced instruction and those who need further review can then be identified. Criterion-referenced evaluations can also be used to identify the course content that students are having difficulty with so instruction can be altered or emphasized in those areas.

Criterion-referenced tests are easily developed by individual instructors and therefore can be designed to measure the specific content or skills that are taught in a course. On the negative side, instructors typically have some difficulty interpreting criterion-referenced scores. Just because two individuals receive identical scores on a criterion-referenced test, it does not necessarily mean that they have mastered the identical content. For example, on a test designed to determine student mastery of the theory of internal combustion engine operation, one student might answer all the questions about engine operation correctly but cannot identify the main parts of an engine. A second student, who received the same overall score on the test, might identify all of the main engine parts but cannot answer the engine operation questions correctly. In this example each student received the same overall score on the test but obviously mastered different content. A careful analysis of individual test scores is needed to identify specific deficiencies for each student.

Criterion-referenced tests measure students against an established performance standard.

While criterion-referenced evaluations are used for making instructional decisions, norm-referenced evaluations are used to make selection, classification, and placement decisions. Students in elementary and secondary schools are given norm-referenced tests to determine their achievement in subjects such as reading and mathematics and are then placed in programs at the appropriate level. Students enrolling in vocational programs are tested to identify their interests and aptitudes and are then directed to programs that will meet their needs. Applicants for positions in business and industry are tested to identify those who have the most potential to succeed on the job. Common examples of norm-referenced evaluations include intelligence tests, placement tests, achievement test batteries, diagnostic tests, readiness tests, and proficiency tests.

Norm-referenced evaluations compare individuals to a group.

Norm-referenced evaluations are designed to differentiate between students in terms of their knowledge and skills. These evaluations result in scores that indicate how a student's performance compares to other students.

For example, a student's score on a mechanical aptitude test may place her at the 85th percentile. This means that 85% of the individuals who take the test obtain lower scores.

Because the development of norm-referenced tests is a very time-consuming and expensive process, these tests are typically developed commercially. As a result, it is difficult to find tests that are appropriate for your intended purpose.

Reliability

A reliable test gives consistent results.

In order to be fair and effective, all evaluations must be reliable. Reliability means the same thing for a test or test item as it does for a person or a car: you can count on it to perform in a predictable way time after time. The old Bic pen ad, "First time, every time," was a promise of reliability. A reliable evaluation is one that gives consistent results.

There are many potential sources of unreliability, and they can be hard to detect.

Statistical assessments of tests and test items can be used to determine reliability. Such techniques are beyond the scope of this book. You should, however, be aware of a few common sources of unreliability. One of the most common reliability breakdowns occurs in lab assignments and practical exams in which the conditions of the task change during the test. Moving parts that come out of adjustment, cutting tools that become dull with use, and work stations that are stocked with different types and grades of consumable supplies can all undermine efforts to develop a reliable evaluation. Written documents that cannot be read; questions that are culturally, racially, or sexually biased; and questions that are ambiguous or unintelligible also diminish reliability. Such problems can render an instrument useless as a means of evaluating a person's knowledge or ability.

Because these and similar factors can sneak in and degrade the reliability of an otherwise good test, it is usually a good idea to evaluate students frequently. Basing an entire semester's grade on only three or four examinations may not give a reliable picture of the students' ability. Giving frequent tests and quizzes, assigning and grading homework, and utilizing projects and other types of assignments as measures of performance will help make your grading system more reliable.

Validity

A valid test measures what it is supposed to measure.

As important as reliability is, validity is an even more crucial issue. A valid evaluation is one that measures what it is intended to measure. In order to be valid, a question or test must have both face validity and content validity.

Face validity means that the test looks like a test.

Face validity simply means that the test should look like a test. That is, it should immediately give students the impression that the instrument is capable of measuring attainment of the objectives that were specified during instruction. Many students have trouble taking a test seriously if they feel it does not have face validity.

Content validity means that the test measures material that was actually taught, and that the emphasis a topic receives on the test is proportional to the emphasis it received in class.

Content validity is primarily concerned with two points. First, the information on a test must have been covered in class or in assigned readings. Second, the content areas that received the most instructional attention should also receive the most coverage on a test. The first point is an error that can result from either poor lesson planning or delivery (forgetting to bring up an issue), from reusing old tests which do not reflect changes in instruction, or from using tests that were developed by someone else. It must be noted that if you are going to use a test written by someone else, reviewing the test before you prepare your lesson is neither unethical nor irresponsible. In fact, it is the only way that you can be sure that you will be teaching the students what they are supposed to know. If you feel that "teaching to the test" is wrong, you do not have to bring up specific test items in class. It is unethical and irresponsible, however, to risk omitting information that your students will be required to know.

Failing to write a test that reflects the topics covered in class or in assignments is often the main problem associated with content validity. It is, of course, impossible to write a test that covers everything that was taught in class. Even a two- to three-hour final exam cannot, and should not, cover every point raised during the course. It is equally inappropriate, though, to ask students to acquire knowledge in a particular area and then ignore it on the test. Consider, for example, an auto mechanics class that has been learning about suspension and steering systems. Instruction and lab experiences might have dealt equally with the operating theory behind, and servicing of, many components: shock absorbers, MacPherson struts, ball joints, torsion bars, front end alignment, camber and toe-in adjustments, and various types of steering mechanisms. A 100 point test that included a 50 point essay on the difference between various types of shock absorbers, a 30 point question on the difference between shocks and struts, and only 20 points on the other components, would not be content valid. Indeed, it could be valid only if about 50% of the instruction had dealt with the differences between types of shocks, 30% had dealt with the difference between shocks and struts, and 20% had dealt with the remaining topics.

Constructing a Table of Specifications can help ensure content validity.

A Table of Specifications, shown on page 69, can help you ensure that your test questions are weighted proportionally to your instructional emphasis. Information for the "% of Emphasis in Curriculum" column can be obtained from your lesson plans. The second and third columns represent the number of content (low-level) and process (high-level) questions that

Table of Specifications for Final Exam in ELT 175

Content Area Taken Directly From Learning Objectives	% of Emphasis in Curriculum	Low Level Knowledge Items	High Level Knowledge Items	Points on Exam
Introduction to Troubleshooting - elements of troubleshooting - strategies for troubleshooting	10%	3	2	5 pts.
Electronic Principles - electronic circuits - current flow - component function and operation	15%	5	3	8 pts.
Schematic & Circuit Reading - schematic symbols - tracing flow	15%	3	3	6 pts.
Diagnostic Tooling - types of diagnostic tooling - uses of diagnostic tooling - taking measurements	20%	5	5	10 pts.
Component Removal & Installation - tools identification and use - procedural steps	10%	2	4	6 pts.
Troubleshooting Practice - isolation of problem - identification of potential faults - testing potential faults - fault repair	30%	9	6	15 pts.
Totals	100%	27 pts.	23 pts.	50 pts.

you decide to include on the test. The distinction between these types of questions is discussed more fully in the "Evaluating Your Students' Learning" section of this chapter. The final column is calculated by multiplying the number of points on the test by the percent of emphasis you placed on a particular topic. In the first case, if you know that you want to write a 50 point test, and if 10% of your time was spent introducing troubleshooting, then 10% of the 50 points, or 5 points, should relate to this topic.

Sources of Error

Random test errors come from inconsistent test administration.

A final factor to consider in evaluation is testing error. Because testing error can dramatically and unfairly influence a person's performance on a test, every effort should be made to mitigate or eliminate it. There are two main types of test error: random error and systematic error. Random error is caused by inconsistent administration of an evaluation. Sources of

Systematic test errors are written into the test.

random error include environmental distractions such as loud noises or cold classrooms during testing and physiological distractions such as a student being tired on the day of the evaluation. Systematic errors are recurring errors. The most common sources of systematic error are ambiguous questions or a multiple-choice item for which there is no correct choice or more than one correct choice. When planning evaluations of learning, you must be aware of these sources of error and try to reduce their impact.

Evaluating Your Students' Learning

As was implied earlier in this chapter, there are many ways to evaluate what your students have learned. Informal observation and evaluation is an integral part of the teaching-learning process, but is more coaching than grading. Formal evaluations provide an appropriate basis for assigning grades, providing feedback, and altering your instruction.

Types of Test Items

Written tests typically contain true-false, multiple-choice, short answer, or essay items, or a combination of some or all of these. A carefully written question can evaluate student performance at any cognitive level. True-false and multiple-choice items are popular with instructors because, while they take a relatively long time to write, they can be graded quickly. However, both types of items suffer from a common deficiency: they support guessing. True-false items are especially guilty of this deficiency. Consequently, a student who knows absolutely nothing about the material can reasonably expect to get about half the questions right. Because of this problem, true-false items are generally unreliable and should be avoided.

True-false questions are generally unreliable because the student has a 50% chance of guessing the right answer.

High quality multiple-choice items are effective for assessing student learning and allow you to cover a great amount of material in a short amount of time. However, when items are poorly written, even a student with minimal knowledge can usually eliminate one or two of the choices, thus improving the odds of guessing the correct answer to 1:2 or 1:3. To help avoid this, all of the choices provided should be plausible, of about the same length, and grammatically compatible with the question. Phrasing the choices so that the correct answer is consistently the longest or shortest item is a giveaway. Questions that answer another question should also be avoided.

Multiple-choice responses should not give away the correct answer, and correct answers should be distributed randomly throughout the lists of choices.

Be sure to write multiple-choice items so that the correct answer is distributed evenly throughout the choices. Students are quick to notice when a teacher predominantly uses one or two choices to the exclusion of all others. If a teacher seems to use choice "B" for the correct answer three times

out of four, alert students will pick "B" for questions they cannot answer, assuming that they will have a 75% chance of getting it right. Rolling dice or using a table of random numbers to place correct answers within the group choices will eliminate this problem.

Short answer questions are easy to write but take longer to answer and grade.

Short answer questions reduce the likelihood of a student sliding by on guile and luck, and essay questions almost completely eliminate that possibility. These types of questions are a lot easier to write than are true-false or multiple-choice items, but they take much longer to grade. They also tend to be more subjective than multiple-choice items; this reduces the reliability of the test. Short answer and essay questions also take students longer to complete. This limits the amount of content you can cover in a test.

Short answer responses that differ from those intended by the instructor may still be correct.

Short answer questions increase the likelihood that the student will give an unexpected but technically correct answer. For example, a welding instructor might ask, "What should be worn to protect your head from sparks while you are arc welding?" The expected answer might be "a flame resistant cap" but "a face shield" would also be true. In such a situation, instructors must remember that perspectives and interpretations that differ from their own may also be valid.

Writing Test Items

When writing test items all types of validity must be kept in mind. The key points in maintaining face validity are fairly simple but are overlooked with alarming frequency. One important point is to ensure that the items are legible, that they are grammatically correct, and that the words are spelled properly. Using a word processor with a spell checker will take care of two of these issues, but unless you have a grammar checker as well, you are pretty much on your own when it comes to using the English language properly. No matter how many types of safeguards your word processor has, remember to proof your test. Also, be sure to leave enough room for students to write their answers to short answer and essay questions. When writing multiple-choice items, you should indent the choices and list them directly under the question.

The most important point regarding validity is that you measure what you want to measure. A common example of a validity breakdown is a test in which an instructor sought to measure his students' ability to identify various tools and machines by identifying them on a map of the laboratory. While this would not be a problem for most students, the approach is none the less invalid; it presupposes, and in a large part measures, map reading skills instead of machine identification skills.

One obvious solution to this problem would be for the instructor to walk around the room pointing to the tools to be identified. Or, the tools could be numbered and the students asked to move from station to station, identifying the tool they find at each stop. Such lab-type tests also work well when you want to measure students' ability to perform certain tasks.

Another example of validity breakdown, and one which occurs frequently, is a test item that is so complicated that a student who does not have excellent reading skills cannot understand it. First and foremost, such questions measure reading ability. This does not necessarily mean that you have to write your tests to meet the "lowest common denominator." Indeed, to do so would be poor practice; you should write all your materials so that they are appropriate for the main group of students in your class. Just remember that some students with special needs may need to have the test questions read to them or have the testing process modified in some way. This does not undermine the testing process if your goal is to determine whether the skills being taught in your class have been learned. Both validity and decency would be violated if a student had mastered the assigned material but received a low grade simply because you would not give him or her the chance to express that knowledge.

Tests may need to be modified for students who, for some reason, cannot interpret test questions.

When oral tests are given, be sure that the student clearly understands the question to be answered. Then, sit back and listen to what he or she has to say. Try to avoid coaching the student or coaxing out a particular response. If you are dealing with a very shy student or with one who is self-conscious about a speech impediment, you may have to give oral tests in a one-on-one setting. Otherwise, you may find that you are measuring public speaking ability instead of subject area knowledge.

Oral tests should measure content and process knowledge, not public speaking ability.

Preparing Tests

The first step in preparing a test is to make a written list of the objectives you expected your students to master during the learning process. Remember that both content validity and fairness require test questions to come in approximate proportion to the emphasis placed on the various topics in class and in assigned activities and readings. Your lesson plans, the textbook (especially the teacher's edition), other books on the topic, and old tests can all be used as sources of questions.

Before you begin writing a test, list the objectives you want to measure. Then, determine the most appropriate types of questions to ask.

Next, decide what type of test will best suit your purposes. Many of the choices have already been discussed: true-false, multiple-choice, short answer and essay written tests; oral tests; and hands-on performance tests are among the options available to you. There is no reason to limit yourself to just one of these types. A test with a practical component and a written component consisting of all of the types of questions listed above could

challenge students to perform at a variety of levels. Such a test also minimizes the complaint, "She didn't ask us any of the things I studied."

As was noted earlier, test items can be written to evaluate student performance at any cognitive level. It is important that questions be written so that they evaluate learning at a level comparable to what was presented in class. If you taught a photography class and emphasized only rules and procedures, it might be appropriate to ask only recall questions, such as "What film developer do we use?" and "Name two errors that can cause negatives to come out too light." If you hoped to instill a deeper understanding, process questions measuring higher-order skills should also be used. The question, "Explain how a company might increase the speed of its 50mm f-1.4 lens, describe the problems that might be encountered, and suggest how they might be overcome," requires that the student recall, understand and apply fundamental rules of optics, f-stop calculation, focal lengths, and lens design; analyze a problem relating to these topics; combine these elements in a new way; and evaluate the results. All of this does nothing to diminish the importance of lower-order skills; they are important components of learning and their understanding must be measured. But measuring only lower-order skills unnecessarily de-emphasizes the higher-order thinking skills that we need to teach.

Items should measure both lower- and higher-order thinking skills.

The final step in preparing a test is to review the instrument you developed to check for sources of random or systematic error. These sources might include poor quality copies, misspelled words, questions that have no correct answer or several correct answers, ambiguous questions, pages that have little or no room between questions and little or no margins around the edges, and questions on one page which refer to a chart or figure on another page. If you have included time limits, be sure that they directly relate to your established objectives. If you are unsure about any aspect of the test, ask a teaching colleague to review it for you.

Once the test is written, check it over for sources of random and systematic error.

Administering Tests

If your class meets for more than one hour per session, most tests will not take the whole class period. In these situations, and in fairness to students who come to class feeling nervous about the test, give the test at the beginning of class. Allowing students time to review their notes is not recommended; this rewards students who failed to study and punishes those who came prepared for the test. Be sure to have enough copies of the test for everyone in the class, plus a few extras. You never know when the copier might give you a blank page, or when some other unforeseeable problem might make you wish for a few extra copies. If scrap paper is needed, you should provide it. Even though it should not be necessary, it might be a good

idea to have a few pens or pencils that students can borrow.

Unless time standards are involved, allow everyone enough time to finish the test.

Be sure to allow enough time for everyone to finish the test. Unless your test criteria legitimately call for a task to be performed within time constraints, pressuring a student who prefers to work slowly is a source of random error. Depending on school policy and your particular situation, you may want to allow students who finish the test early to take an extended break until the test session has ended, or until everyone has finished and has taken at least a short break. If you do not intend to allow early finishers to go on break, you might consider not collecting the papers until everyone has finished the test. This helps keep those who are finished from getting fidgety. Under no circumstances should you have students wandering around the room while others are still taking the test. This is another source of random error. The exception to this, of course, is if you must give both the written and practical portions of a test in the same room. Then you and your students must all recognize that you are stuck with an undesirable situation and work together to minimize disruptions.

Establishing Grades

Before you begin grading the tests, you must assign a point value to each question. It is best to do this when you are writing the test so that students will know the relative value of each question. Multiple-choice items are easily graded; the answer is either right or wrong. As noted above, short answer and essay responses may differ from the response you wanted but may still be correct. As such, they must be graded with an open mind.

A checklist will help you impartially and consistently evaluate essay responses.

If you are unsure about what you wanted an item to measure, essay questions can be hard to grade. One useful approach is to identify the components of a proper response, and grade the answer based on the presence of these components. Extra credit can be given for appropriate components that were not a part of your expected answer. The main point is to try to be as consistent as possible when grading students' responses.

Laboratory projects are another important source of grades. Some projects can be graded according to a checklist, with points assigned or deducted in accordance with an established scale. But some projects simply cannot be assigned a numerical grade based on the accumulation of points. In grading a photograph, for example, adding up points for composition, focus, quality of the print, etc., can lead to a grade that completely misses the subjective value of the project. In such cases it is more useful to consider the qualities of the product and the capabilities of the student and then decide whether the work is excellent, above average, average, below average, or poor. A grade may then be assigned based on this evaluation.

Tests should be returned quickly, and students should be allowed to keep their tests for use as a study guide.

Because tests serve as a means of both evaluation and reinforcement, they should be graded and returned to the students as soon as possible. In order to make your mid-course tests a part of the instructional process, let your students keep their tests to study for the final exam. Depending on your outlook, this may prevent you from using that particular test again, but you will have improved your students' opportunity to learn from past mistakes.

A rational, consistent, and fairly applied grading system can eliminate many complaints when students get their tests back. Even so, conflicts can arise when students are told their answers were wrong. After all, if they didn't think it was correct, they probably would have written something else. Do not avoid or stifle class discussion of the test; it is a sure sign that your students care about their grades. However, after an appropriate amount of discussion about an item has taken place, ask students who believe that they were unfairly marked down to write "Please reconsider question number (whatever item is in dispute)" on the top of their paper and resubmit it to you. You should make it clear that this is not a promise to change the grade. It is, however, an indication that you understand that the student holds a position different than yours and that you are willing to take that position under consideration. This is only reasonable; upon reconsideration, it might turn out that you were, in fact, wrong, or that both positions are equally valid. Under no circumstances should you say something like, "If you want me to regrade part of the paper, then I will regrade the whole thing." In addition to being a childish response, this carries a huge implied threat that can destroy an effective teacher-student relationship.

At the end of the course, all of the various grades earned by the students must be combined into a final course grade. If you have been using norm-referenced measures, you will probably calculate the grade based on the students' rankings relative to other members of the class. If you have been using criterion-referenced measures, you will most likely grade your students based on the ratio of successfully vs. unsuccessfully completed objectives. Or, you may have devised some combination of these systems. In either case, the grade the students receive should not be the grade you "gave them." It should be the grade they earned.

Recommended Reading

Mager, R. F. (1989). *The New Mager Six-Pack.* Belmont, CA: David S. Lake, Publishers.

This collection of six works deals with most aspects of pedagogical technique. Of particular benefit with regard to evaluation of instruction are "Analyzing Performance Problems," "Instructional Evaluation," and "Goal Analysis." This series is available from the Illinois Vocational Curriculum Center at Sangamon State University.

_____, *Performance-Based Teacher Education Modules, Category D: Instructional Evaluation.* Athens, GA: American Association for Vocational Instructional Materials.

The first five parts of this six-part series deal with establishing student performance standards, measuring attainment of specified skills, and determining grades. These publications are highly recommended to anyone seeking additional information on this crucial aspect of the instructional process. They are available from the Illinois Vocational Curriculum Center at Sangamon State University.

Chapter 9

Evaluating Instruction

Using Tests to Assess Your Teaching

Tests can evaluate both student and teacher performance.

As was noted earlier, evaluations measure more than student achievement. They also measure the effectiveness of the instructional process and serve as a guide for improving instruction. In terms of instructional effectiveness, the most common use of test results is to see how many students missed a particular question. If most people got the question right, you can be fairly confident that the point was effectively taught and learned at some point in most students' past. If a large number of people chose the same wrong answer, any number of factors could be at work. You may have phrased the question poorly, you may have given incorrect information in class, or the information in the book may be different from what you believe to be true. This is an excellent reason to read all materials before you assign them. Not only do legitimate differences of opinion exist in many fields, but textbooks do contain errors. If a wide variety of incorrect answers was given, the students were probably guessing. You must be sensitive to all of these possibilities when you grade a test.

If a test indicates a general lack of understanding, the material must be re-taught.

Regardless of the source of the problem, when a large number of students miss a question or group of questions, it generally indicates that the material should be re-taught. Re-teaching is a difficult task because, before you can get the correct information across, you must first undo the incorrect learning that must be presumed to have taken place. When a point is being re-taught, it is usually not sufficient to simply give the same lesson again. If it didn't work the first time, it probably won't work the second time, either. Instead, try looking at the topic from a new viewpoint. An analysis of incorrect answers and discussions with the students (don't be afraid of their ideas!) might give you an idea of what misconceptions must be overcome and what your new approach should be.

Re-teaching almost always requires the instructor to approach the material in a new way.

One of the nightmares that haunts every caring teacher is, "What happens if they all fail?" One approach to this problem was demonstrated by a university chemistry professor who, after 17 years as a research scientist, was teaching for the first time. After the mid-term exam, on which the average score was below 35%, he walked into the classroom and gave this speech: "I have been associated with university chemistry departments

since I graduated from high school 25 years ago. In all that time I have never seen nor heard of such horrid performance. I am a good chemist, and have taught you well. I can only conclude that you did not study. We will, therefore, continue to follow the syllabus. I strongly recommend that you try studying before the final." With that, he launched into the second half of the course. Needless to say, the failure rate was even higher on the final, and still worse in the subsequent semester. This story does have a happy ending, though. During his third semester, the professor was assigned a mentor and given considerable assistance by the department head. In effect, this unquestionably proficient chemist was taught to be an equally proficient teacher.

Being a good teacher is a skill that must be learned.

One of the things the chemist learned during his retraining was to evaluate test results to identify areas of misunderstanding. He also learned the value of testing students frequently. Weekly or biweekly quizzes can point out the difficulties students are having at a time when they are easily correctable. Finally, he learned the value of re-teaching and re-testing. Rather than curving the grades so that the least poor performances are given passing grades, it is far better to set the test aside and re-teach the material.

Frequent evaluations are better than basing an entire semester grade on a few factors.

It is true that having to re-teach several weeks of material may keep you from finishing everything on the syllabus. If you find yourself in such a position, talk over the problem with your department head as soon as possible. It may be better to give your students the equivalent of half a semester of positive learning experiences than a whole semester of mediocre or negative experiences. By discussing the problem with your supervisor you can get help in devising a remedial strategy and alert the department to the fact that the instructors of subsequent courses may have to teach some skills that they would normally expect their students to have already acquired.

If it seems likely that you will not get everything covered, notify your supervisor as soon as possible.

Finally, evaluating the results of well constructed quizzes and tests can also help the instructor determine whether students are attaining the proper mix of content and process knowledge. This provides feedback that is useful for both guiding the direction instruction takes in the current class and for modifying lesson plans, tests, and syllabi for future courses.

All of this is not intended to say that the instructor is always to blame for poor test scores. It could be that many students in a particular class simply are not willing to expend the effort necessary to succeed. These students may require additional motivation, and it is the teacher's responsibility to find out what appropriate motivating factors can be used. Or, it could be that the instruction is good, but was at the wrong level. This is especially likely if you are teaching an upper-level course and the students did not receive an adequate foundation in previous classes. None the less, instructional problems must be addressed as soon as they are noticed.

The causes of poor test scores must be evaluated objectively and with an open mind.

Failing to do so transfers responsibility for the problem to the current instructor.

Surveying to Assess Your Teaching

We have, to this point, not considered any type of instructional evaluation other than student tests. There are, of course, several other ways to evaluate teacher effectiveness. One of the best ways is to survey students to find out what they like, or liked, about the course and what suggestions they would make for improving it. Such evaluations are often conducted at the end of a course. There is, of course, no good reason to not give students a chance to express their opinion during the course. Doing so is especially appropriate if you feel that your instruction is not getting through to the students. Most colleges have survey instruments available for your use. Indeed, some institutions require that a survey be conducted, usually at the end of the semester.

Student surveys are an excellent source of information on the quality of instruction students feel they are receiving.

When you conduct an opinion survey, you must make every effort to assure student confidentiality. Without this, the responses you get will be meaningless. First and foremost, make it clear to the students that they are not expected to put their names on the paper. Also, do not ask your students to give their age, gender, curriculum, academic standing, or any other information that could single them out. Using a format in which a response can be checked or circled, rather than written, assures students that their handwriting will not give them away. Open response questions may be included at the end of the instrument. And, of course, leave the room while students are filling out the instrument. The best approach is to give out the survey during the last few minutes of class and then go back to your office, a lounge, or someplace away from the room. Tell the students where you will be, and ask either a specific person or the last person in the room to bring the completed forms to you.

Surveys may be conducted at any time during the semester.

A survey that does not ensure the anonymity of the respondents will not be valid.

Asking for an evaluation is a scary thing; no one likes to open themselves to criticism. Your students understand this and will generally make constructive comments. This is especially true when mid-course evaluations are used. They want to receive the best education possible and will almost always respond positively to your expression of interest in their opinions. If you conduct the evaluation before the course ends, be prepared to discuss the responses during the next class. You don't have to make changes that you feel are counterproductive, but no one likes to be asked for their opinion and then have it ignored.

Reflectively Evaluating Your Teaching

At some point, everyone asks themselves whether they are really suited for a particular job. After all, not everyone is suited for every job. In teaching, there are two main factors that must be considered: whether you like the job and whether you do it well. Clearly, there is a relationship between these two points.

When assessing teaching effectiveness, student surveys provide only part of the picture.

How can you tell if you are doing a good job? Student surveys, such as those described above, are an excellent source of information on instructor performance. However, extreme caution is needed when making a performance evaluation based on student opinion; the picture you get may not be valid. Regardless of the evaluation procedure used, some students will feel that it is imprudent to criticize an instructor, especially mid-semester. A few students will have nothing good to say, regardless of the quality of instruction. And among those who try to give an accurate assessment of instructor performance, standards may vary so much that the results are not particularly meaningful. For example, one student might value an instructor who uses class time efficiently and maintains strict performance standards, while another might prefer a teacher who runs a rather loose ship.

As useful as student evaluations may be, they still fall short of providing an objective picture that you can use for self-evaluation. A video camera can, however, provide just such a picture. Placing a video camera on a tripod at the back of the room and letting it record your teaching is a fairly unobtrusive way of gathering information that you can evaluate at your leisure. Initially, performing in front of a camera may be a bit unnerving for both you and your students. If you explain to them what you are doing, and why, they will accept it and may even gain a new appreciation for your efforts at self-improvement.

A video tape of your lessons allows you to see whether you measure up to your own standards and may point out strengths and weaknesses you did not know you have.

When you watch the videotape, there are several things that you should look for. Observe your teaching style: do you talk to the class, or to the floor? Do you speak clearly and use your voice effectively? Is the material you write on the board legible from the back of the room? Do you recognize and respond to students' comments and questions? Finally, do you actually come across the way you think you do? Videotaping is a convenient, inexpensive, and accurate way to gather data on all of these questions.

Another means of assessing your performance is to review the academic and technical progress that your students are making. If you were not teaching effectively, they probably would not demonstrate proficiency gains. Analysis of student test scores and observation of student performance are good indicators of successful teaching. Other aspects of instructional effectiveness typically include the ability to plan for and efficiently

direct class activities, recognize and accommodate individual differences, competently and enthusiastically cover instructional material, encourage and freely accept input and constructive criticism, and adapt to changing circumstances.

Because self-evaluations and student evaluations can lack reliability, validity, or both, it is often useful to be observed by one of your peers. Peer observations may be informal, as when you ask a teaching colleague or college administrator to sit in on your class and then share their observations with you. Or they may be quite formal, as when an observation is conducted as part of a personnel evaluation. In either case, the results of the observation should be viewed as the efforts of two professionals — you and the observer — to improve the quality of instruction being provided to the students.

Your peers and supervisors can also provide an objective evaluation of your teaching techniques.

Any useful evaluation will suggest areas of strength that should be continued and built upon, and areas of weakness that need to be strengthened. What can you do to improve in these areas? Reading professional literature, such as this handbook and the references cited as recommended readings, can help you identify strategies that might be applicable in your situation. Most of these publications are available through your college's interlibrary loan program, from the Illinois Vocational Curriculum Center at Sangamon State University, or from Curriculum Publications Clearinghouse at Western Illinois University.

An evaluation that does not suggest improvements is useless, because no one is perfect.

One-on-one assistance and help with unusual problems is also available within your college. Observing other instructors and discussing methodology with them can give you insights into how other instructors have dealt with similar problems. Your department head and other administrators can also help you identify and evaluate strategies. After all, it would be extremely unlikely for you to run into a problem that has not been successfully dealt with before.

Your supervisor can recommend materials that will help you improve your instructional effectiveness.

Once you identify some things that can be done to strengthen your weaknesses, select the remedies that best suit your personality and begin experimenting with them. One of the nice things about teaching is that if you don't like things the way they are, you get a chance to change them at the start of each new semester.

Recommended Reading

_____, *Performance-Based Teacher Education Modules, Category D: Instructional Evaluation.* Athens, GA: American Association for Vocational Instructional Materials.

The final part of this series, "Evaluate Your Instructional Effectiveness," provides instructors with additional practical information on how they can evaluate their efforts. This publication, too, is available from the Illinois Vocational Curriculum Center at Sangamon State University.

CHAPTER 10

Working With Students With Special Needs

Who are Students with Special Needs?

Students with special needs can learn. They may, however, require some instructional modifications.

The common perception of a student with special needs is one who has a physical, mental, or behavioral handicap. While these individuals certainly do have special needs that must be met if they are to fully benefit from our educational programs, so do members of a number of other groups. These groups include individuals who are gifted and those for whom English is not the native language.

Obviously, each of these groups of individuals require different consideration and possible modification of the instructional process if they are to get the most out of your class. This chapter will help you understand how you can individualize your teaching in order to meet their needs. It will also outline some of the characteristics that typically indicate that a person has a special need.

You are not responsible for identifying individuals as having special needs. You are responsible for meeting those needs.

The following descriptions are provided with a certain amount of hesitation. It is not intended that you use these lists to diagnose anyone as having any sort of handicap. Such diagnoses are difficult even for experts in the field. Just because a student has one or more of the attributes listed does not mean that he or she falls into some special classification. Similarly, a person could be classified as a "student with special needs" even though none of the characteristics listed herein seem to be present. If a student is part of a special population, it simply means that the person learns at a different rate and in different ways than most other students. The point here is not to label students, but to recognize and accommodate their special needs.

For some, making needed accommodations is a morally correct thing to do, and is therefore done willingly. While most educators prefer that this be the impetus for modification, it is nonetheless recognized that some instructors modify their programs and facilities only because federal law requires them to do so. In either case, it is the end result, accommodation of students with special needs, that is important.

Slower Learners

Most of the modifications needed for slow learners are simply extensions of the effective teaching techniques outlined elsewhere in this handbook.

A 1986 the National Center for Research in Vocational Education publication states that slower learners tend to:

- have low reading abilities
- not to be aggressive or highly competitive
- learn physically
- deal with the real and concrete far better than the abstract and theoretical
- have difficulty handling relationships, such as size, time, and space
- be limited in self-direction, personal initiative, and ability to overcome obstacles
- prefer the company of peers or of people younger than themselves
- accept people and information at face value
- have relatively short attention spans, low levels of concentration, and little organization
- be interested in the present and the immediate environment and often act on impulse;
- be generally incommunicative
- be comfortable with repetitive work, drill, routine, and manual work
- be emotionally unstable with a high rate of absenteeism.

The same publication suggests using these instructional techniques when working with slower learners:

- provide opportunities for plenty of practice and drill
- provide the time necessary to learn; teach visually; use real experiences related to classroom instruction
- during instruction, make new relationships clear
- use a physical (hands-on) approach to learning
- teach by small steps
- use learning devices or games to aid retention
- teach basic know-how
- use a reward system for good work
- provide an atmosphere of low tension and low stress
- use individualized learning materials whenever possible

Reviewing this list, you may be struck by one of the sadder realities of education today. All too often you hear teachers say that they cannot teach a student, or a group of students, because they "just aren't smart enough." What these instructors fail to realize is that the methods of instruction used to teach slower learners are virtually identical to many of the principles of good instruction outlined elsewhere in this book. It is not that these students cannot learn, it's just that they just take a little longer and may be limited in the extent of their achievement.

Gifted Learners

Gifted learners should be challenged to the limits of their ability.

The National Center for Research in Vocational Education publication also lists several characteristics of gifted students. They tend to:

- have good reading ability and to enjoy reading
- be verbal and communicative and possess an extensive vocabulary
- be generally aggressive and competitive in the scholastic situation
- be independent, initiating more activities on their own and more frequently attempting to overcome obstacles by themselves
- be able to deal with abstract concepts and theoretical ideas
- be able to generalize, to see relationships, and to visualize
- have relatively long attention spans and ability to concentrate
- respond to pressure, expectations, and stress
- be interested in the future and the world at large rather that limiting their interests to immediate concerns
- have the ability to delay gratification in pursuing long-term goals
- get bored by repetition and routine and often seek new stimuli
- be impatient with detailed instructions and short tasks.

The instructional techniques that are appropriate for gifted learners are to:

- keep them challenged with new material
- maintain high expectations
- evaluate students' work with care and thoughtfulness
- use discovery techniques
- use learning activities involving creativity and communication skills, (such as) independent study, group work, technical reports, leadership opportunities, use of community resources, and creative and inventive activities. Gifted learners also tend to appreciate and respond to the chance to produce a creative work that contributes to the field they are studying.

Physically Handicapped Learners

Most students who are physically handicapped have learned to accommodate their disability. They are your best source of information on what accommodations you need to make for them.

In many ways, students with physical handicaps require the least active intervention on the part of the teacher. By electing to participate in higher education, these individuals are indicating that their handicaps are a part of life that must and can be dealt with, and not an insurmountable obstacle. Your job is to help them accommodate their special needs in any appropriate way possible. You may think that a certain handicapping condition will prevent a student from succeeding in your occupational area. Perhaps you are correct, but every student deserves your complete cooperation as they exercise their right to try and succeed.

Using a common-sense approach to working with learners who are handicapped will eliminate most problems.

Letting students who are visually handicapped sit in a place that allows them to use the full extent of their sight is a common-sense approach. Those with severe visual difficulties may benefit from handouts written in large, dark type. Your college may have a facility that translates written material into braille for those who are unable to see well enough to read. During demonstrations, allow these students to stand at the demonstration table so that they can touch the apparatus and feel what is being done during each step of the procedure, if possible. They may also need someone to guide them through the room or unfamiliar areas.

Students who are hearing impaired may also find it necessary to sit or stand very close to you so they can hear or lip read what is being said. In some cases a sign language interpreter may accompany the student. Appropriate accommodations should be made for these interpreters. These students, as well as those with a variety of other handicaps, may also benefit from having class proceedings videotaped for review at a later time.

Students who are physically handicapped generally only require that you be sensitive to their needs and provide seating and other arrangements that minimize their difficulty in getting into, around in, and out of the classroom and laboratory area. If your facility does not seem to lend itself to the needs of a particular student, contact your department head immediately. With advice from the student and vocational rehabilitation specialists, special ramps and other modifications can be built to allow full participation in class activities.

Learners for Whom English is a Second Language

Limited English proficiency is not the same as limited ability.

The most important thing to remember about students for whom English is a second language is that any problems they may have in understanding English probably do not stem from any sort of handicapping condition. They may simply not be proficient in the English language. It is also important to recognize that, because of this, they may see enrolling in a community college as a rather risky venture. One of the most important things you can do for these students is to provide, or identify sources of, help before their language limitations cause them to fall behind or fail.

There are three steps that you can take to improve your instruction for these students. First, speak clearly and slowly. This allows the students to identify and translate your words into their language; only very fluent multilingual students can think in another language. Second, provide lots of handouts that can be translated at a later date. These serve as a means of confirming that what the student thought he or she heard was, in fact, correct. And finally, be patient.

Recommended Reading

Sarkees, M. D., and Scott, J. L. (1986). *Vocational Special Needs*. Homewood, IL: American Technical Publishers, Inc.

This text is an excellent source of information on how to teach students with special needs. The authors cover all aspects of program and facilities modification, and discuss specialized referral, assessment, and job placement considerations. The book is available from the Illinois Vocational Curriculum Center (IVCC) at Sangamon State University.

Many other excellent publications dealing with special students are also available from IVCC, most other libraries, and most community college special needs offices.

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